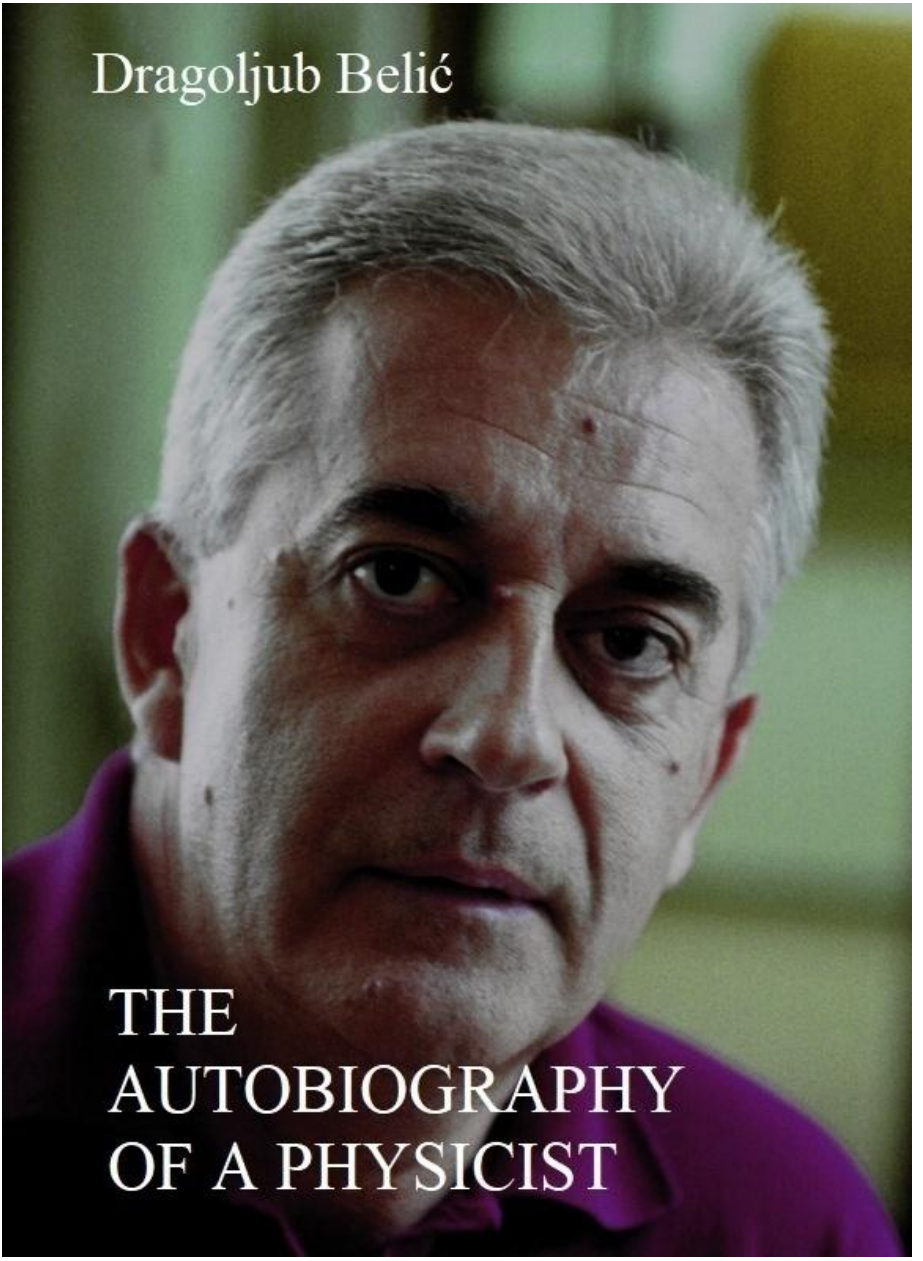
Dragoljub Belić
THE
AUTOBIOGRAPHY
OF A PHYSICIST

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TO RICHARD, GORDON AND FREDDY

i

I spent my childhood in Zabrežje near Obrenovac, on the right bank of the Sava River, right on the border with Srem, in Serbia. My mother Angelina was a housewife, and my father Svetolik, a craftsman, one of the last blacksmiths, ferries and scaffolders in the region. On the Srem side, there are the spacious villages of Boljevci and Progar, which were closely connected to the Obrenovac livestock and green market. Dozens of carts crossed the river by ferry every day, and they were especially numerous on market days - Wednesdays and Saturdays and during the fair holidays of Petrovdan and Krstovdan. They had beautiful horses and light chariots with decorated ropes and bent bars on the wheels. In the summer, they brought the vegetable garden by car, covered with fresh straw to protect it from the sun. For days they cruised around the village and announced: "Here is the orchard..." At that time the village had two main streets. One straight road, a road with Turkish cobblestones, led two and a half kilometers from Obrenovac to the center of the village with a school, a clinic, two taverns and a fire station and a spacious square overlooking the Sava. On the square was also the building of the river captain's agency on the steamboat waterway between Šabac and Belgrade, as well as the departure station of the narrow-gauge railway that led directly to the center of Belgrade via Obrenovac. The second street made a winding chord from the square in the center to the

same right bank of the Sava, after a large meander, at the other end of the village, the so-called Laundry.

In the summer, both streets were covered with a few centimeters thick layer of dust, which rose behind the carts and in the fall turned into thick mud enriched with the debris of the transported harvest. This mud was sticky and we children used it to make cannons on Sundays and holidays. In a larger mud cube, we would make a big hole on one side, lift the cube above our heads, turn the hole face down and slam it down with all our might. The compressed air in the hole would break through the bottom of the hole with a loud bang. On Christmas Eve and Christmas, metal slingshots were made that were filled with real gunpowder and, with the assistance of older boys, brought a cheerful festive atmosphere to the village.

My father had a blacksmith's workshop in the back part of the yard; he completed the blacksmith-horseshoe trade. The workshop was small, with a huge beech stump in the center of which was a massive steel anvil, the smooth top surface polished from the heavy pounding of the hammer on the red-hot iron objects being forged. On the left side of the anvil was a bellows with a firebox in which charcoal was heated to high temperatures, the so-called charcoal, for heating iron objects. A bellows made of thick cowhide in the shape of large bagpipes had an opening with a movable cover - a flap, through which air was blown out in only one direction when the blowing lever was activated. On the opposite wall was a massive wooden counter with an attached vice called a screw driver and a bunch of tools with the most varied uses: hammers, pliers, cutters, kirners, duchlags, bansecs, etc.

My father didn't like the new post-war regime, he didn't openly oppose anything, but he used to say that all the idlers and vucibatine had gathered. He was offered on a couple of occasions to work in a state-owned enterprise, the nationalized lathe of pre-war successful industrialist Aleksandar Aca Simović, who during the war helped hide the communists, and they shot him at the end of the war. Sawmill was located near our house, on the banks of the Sava, and processed timber brought down by rafts from Bosnia down the Drina and Sava rivers. Huge logs were pulled out of the water by large Styrian horses, twice the size and weight of domestic horses. They needed a blacksmith and horse shoeing, but the father did not accept it. He didn't like the turner "honking his horn every morning" at 6 o'clock to go to work. Otherwise, as a private citizen, he worked a lot and hard. He had big hands and strong arms. During the season, he also accepted other jobs. For a time he was a feeder on grain threshing machines, and later he became a co-owner of vessels, a derrick and a motor boat, for transporting passengers, carts, horses and cattle across the Sava between Boljevci and Zabrežje. Mother was devoted to her family, hardworking and resourceful, and she was always able, even in complex situations, to cut the Gordian knot and find the right solution.

During elementary school, my older brother and I helped our father in the forge; at first we did lighter jobs, and later more serious jobs. It wasn't difficult for me, school was going well, so I had free time and working with my father was interesting. At that time, there were no mobile phones, no computers, no television, not even every house had a radio. i

have remember that the funeral of J.F. Kennedy was broadcast on the radio and that all the women from the neighborhood cried and wailed when Jacqueline and the children said goodbye to the deceased.

I was curious and as a child I started to indulge in various thoughts. One of the first puzzles I encountered was the expansion of the body in the heat. I approached the problem with thought and practical application. An important part of the blacksmith's work was, among other things, the maintenance and repair of carts. The wagons were made of wood with wrought iron fittings. There were no tires on the wheels at that time. They were made of wood, with a central circular hub into which twelve spokes were driven radially, and each adjacent pair of spokes joined to an arched rim that was part of a larger circle. This outer circle of the wheel carried a circular iron rail with a diameter of e.g. 80 or 100 cm and about 1 cm thick that turned on the road. That rail carried the entire load of the cart and required a special process to be pulled over the rims to ensure the compactness and strength of the wheel. The rail was made from a flat bar that had to be measured, cut, bent into a circle and joined at the ends. Since it was done without a welding machine, the ends were joined by thermal welding. The rail is bent so that the ends overlap a little (by feel), then they are heated to a white glow and joined. The heating is repeated several times until the ends are literally blind, with continuous correction with hammer blows. The goal is to obtain a homogeneous circular structure with an inner diameter slightly smaller than the diameter of the wooden circle of the wheel composed of 6 rims.

Next comes the most delicate part of the job. An iron rail with a smaller diameter should be pulled onto a wooden wheel with a slightly larger diameter. This was done with the help of one of the three old mulberry trees on the grass strip on the street in front of our house. A thick metal peg was driven into the mulberry tree, just above the ground, which served as a support for the wheel. A wheel was placed on two goats, a slanted wooden tripod specially made for this operation with one longer side, and one end of it was pulled under a thick metal peg in the nipple. Near the wheel, a rail was placed on three bricks on the rim, and on it was placed a strong fire made of dry corn stalks or small dry branches. The rail is heated to incandescence and thus its diameter increases. With pliers, it is placed on the wheel so that it overlaps with it under the stud, and must with the help of two so-called radapcigers with a single-arm lever to slide onto the wheel. Then the rail is quickly cooled with water, shrinks and becomes a compact unit of a stable weighted wheel. And that's all. Physics has done its part.

After elementary school, I enrolled in high school in Obrenovac. I walked about three kilometers in one direction. At the beginning of the first grade, a new physics teacher, Vlasta, came to the school. He was from Pirot and previously worked in a military school. He persevered with the students, and had a somewhat stiff demeanor and a hard accent. As an educational measure, he distributed several units in each class at the beginning. He asked for work and discipline. He was able to ask questions that required understanding of the material. On one occasion, I remember, he spoke about forces and asked the following question: "Imagine that we have a

hook on the ceiling, we hang a rope on it to which we tie a massive body and to that body we tie another rope of the same material (with the same spool) and let's withdraw. At what point will the rope break?" Everyone was silent. I thought for a while and raised my hand. The professor looked at me and said "Here you go, colleague." It depends; I began, on how we pull the string. If we pull slowly, the string will snap above the body, and if we pull quickly, it will snap below the body. Everyone was silent and looked sometimes at me, sometimes at the professor. He sat motionless for a few moments, and then his unusually white teeth first showed, and then his lips and mustache lifted into a benevolent smile. Well done colleague, he said, and now explain to us why it will be like that. I briefly said that in the first case, the force with which we pull will be added to the weight of the body and will be greater above the body, and in the second case, the force of inertia of the body will be added to the lower part of the string, which will break as a result. Give him a two - shouted the students in unison, led by the bad reputation the professor has already gained in grading. Well, this is for more than a two, he said, for now I give him a three, and I will ask him for more.

Of course, I got a higher grade, and physics was still one of my favorite subjects. So in the end I decided to write my graduation thesis from that subject as well. I chose to write about cosmic velocities. Professor Vlasta directed me to get literature from prof. Tatomir Anđelić from the Department of Astronomy at the PMF in Belgrade. Prof. Anđelić was very kind and gave me a mini-series of an astronomical magazine

related to space flights. I still decided to study physics and enrolled at the same PMF.

In addition to physics, I also liked philosophy, mathematics, logic and psychology in high school. In the older classes, I returned home with a group of younger students, where we had various useful discussions, which shortened our time. We were like a small informal peripatetic school of philosophy.

In the fourth grade of the high school, there was an announcement that an extraordinary test would be organized that would assess the level of knowledge achieved in Belgrade high schools in several subjects. The gymnasium in Obrenovac was run, as far as I remember, as the XVII Belgrade gymnasium. Unexpectedly for me, this high school had the best results in Belgrade on that test.

The graduation party was organized by the high school together with several others, at the Yugoslavia Hotel in New Belgrade. It was a huge space, with a professional orchestra of varied repertoire and famous guests, presenters and an entertainment program. Dinner was served, and during breaks we all danced together on the big podium. I also met some peers from other schools. I liked to dance and I practiced it at the occasional dances organized at the Army Home in Obrenovac. When they announced that "ladies are choosing", I was startled by a cute girl with big eyes and very black short hair, from X high school. She was cheerful and admitted to me that she noticed me dancing, so she didn't leave me until the end of the evening. It turned out that she brought me luck. Towards the end of the evening, a lottery draw was organized with the help of the serial numbers of our tickets. They were

among the first to draw my number. The prize was participation in the final graduation evening of representatives of all schools together. And that was not the end of the luck, that second evening a lottery was organized again and then I won a prize trip with Yugotours to Moscow and Leningrad! I also passed my driving test that summer.

Traveling to Russia was a fantastic experience for me. We traveled by plane to Moscow, then by the "Red Arrow" train to Leningrad (now Petrograd) and in the same way in the opposite direction. In Moscow, we stayed in a nice old hotel near the center, Red Square, the Kremlin and St. Vasil's Blessed Church with its magical bell towers. We had a good and eloquent guide. A visit to the Vladimir Ilyich Lenin mausoleum on Red Square was planned for the first day of the stay. It was located in the southern part of the spacious square, right next to the walls of the Kremlin. A huge line of visitors stretched across the square from the Historical Museum, waiting for hours. The biggest crowds were during the changing of the guard, which was attractive, a well-rehearsed operation that everyone wanted to see. As foreigners, we had a special entrance and didn't have to wait long. It was entered in pairs. In front of the mausoleum, Mira approached me, took my hand and said: I will be your companion, do you agree? (How would you disagree, God bless you, as Lala would say). From the entrance on the level of the square, one stepped onto the platform below which, at a depth of a few meters, lay the embalmed body of Lenin. In order to see him, the visitors had to lean forward, that is, they all had to bow to him, which was a special curiosity.

Just across the square was the largest department store in Moscow, GUM, which is an acronym for "State Department Store" in Russian. It had three floors and was very long, full of everything and anything. There were five or six of us in the group so we wouldn't get lost. We were looking at what to buy as a souvenir. I took some device for enlarging and viewing slides - a film scope and a bunch of slides with sights of Moscow. I also found an affordable semi-professional camera for developing films and making photos, in black and white. At one point, a guy and a girl, Russians, approached us and asked us if we had anything to sell. They meant clothes. The Russian caught Uncle Djoka by the sleeve of the black roll he was wearing under his overcoat and asked - how much? We tried to explain that it was not for sale, but the Russian insisted, offering $20. In the end, Djoka agreed, in one corner of the corridor he took off his shirt, put a coat on his naked body while we covered him, and took the dollars. Mira was traveling with Uncle Djoka and his wife, she was an attractive blonde a little younger than them, I noticed her at the airport in Belgrade, and she was escorted by an aviation officer in a blue uniform. And she emptied her purse and sold it to the Russians. I didn't have anything with me, but I mentioned that I had some T-shirts in the hotel. Later that day the same guy came to the front desk and found me. He liked my blue and white cougar print t-shirt. The hotel staff cooperated in the purchase and sale. It was not clear to me what was happening, but it was obvious that there was no other way for them to get to some things. By the way, the ratio of the dollar to the ruble was approximately one, but the

dollar was sold illegally for three rubles. This event made me think more deeply. But then I didn't have much time for it.

In Moscow, we also visited the Bolshoi Theater, rode the grandiose metro and visited the Borodino Battle Panorama, which left visitors breathless. It is dedicated to the war with Napoleon in 1812. The main exhibit of the museum is the panorama, a huge painted canvas measuring 115x15 meters, which hangs in a closed circle and represents one of the most important moments of the Battle of Borodino Field. Observers enter by stairs from the lower level and step onto some sort of observation deck. From them begins a circular scenography with damaged trees and military equipment, sculptures of wounded soldiers and horses and it spreads radially to the horizon painted on the canvas, with faithful details of the relief and the arrangement of opposing military units.

I thought about the contrast that exists between this sublime performance from the Moscow suburbs and the black roll trade in a Moscow department store.

We traveled all night to Leningrad on the Red Arrow train, north all the way to the confluence of the Neva and the Baltic Sea. It was, in a word, a real imperial city. The city was founded by Peter the Great in 1703. He invited many architects and engineers from all over Europe who drained the swamps and built one of the most modern cities of the time, modeled after Paris and Versailles. We visited the Winter Palace, a magnificent building with fountains and a beautiful view of the sea, which was originally the imperial residence and in which all the rooms are decorated with gold,

precious stones and valuable works of art. Today, the Winter Palace is part of the Hermitage, one of the largest and most important cultural-historical and art museums in the world with over three million exhibits. A special attraction is masterpieces from the Renaissance to the beginning of the 20th century: Michelangelo, Leonardo da Vinci, Rubens, Rembrandt, Vincent van Gogh, Henri Matisse and others. In addition to the painting collections, the museum is known for its archaeological collection, the collection of medieval European art, the collection of sculptures and applied art, as well as the collection of Russian art of all eras.

I only saw a small part of the museum; I think it's a sin to build big museums. One looks around, gets fed up and tired of the overwhelming beauty. It seems to me that art should also be demographically democratized. It is necessary to create museum departments in other, smaller places and thereby enrich them as well. I mean this.

I stayed in touch with Mira even after the trip. We would see each other occasionally for a drink since she worked as a translator for the Yugoslavia film in Knez Mihailo Street. For my birthday after the return, she gave me the Collection of poems Gardener of Rabindranath Tagore.

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Before starting university, I decided, in agreement with my parents, that I would live in a student dormitory in Belgrade during my studies. The reasons for that were the difficulty of college and the bad experience of the older brother who lived with his parents, and his studies were going rather sloppily. In the first year, I got a place in Patrice Lumumba student dormitory in Karaburma. Four students, plus one illegal, were accommodated in two bedrooms with a shared studying room. I was the only freshman.

I got to know my roommates very quickly, as well as the peculiarities and pitfalls of living together. Everyone carries with them some habits and culture of living that should be respected and have a certain amount of tolerance. You simply have to apply the old rule: do not do to others what you would not like them to do to you. However, I want to highlight here a latent trap that is typical for young people. It's conducting vain discussions, in the sense of - grandmother rubbed flax. When three or more students get together, whatever topic is brought up after some time, everyone gets involved, the story goes on endlessly and a lot of time is lost. I realized this after a few "lost" evenings and since then I started avoiding such occasions. I would take something to read or go out for a walk.

I set aside one day of the weekend to go home, usually Sunday. I would visit my parents, help in the garden or orchard and have lunch with them. Mother would also regularly make cherry pie as a treat. On the way back, I would take a pastry bag, a pie sheet folded into a spiral and wrapped in a thick paper bag. And every time that bender reminded me of writer Ivo Andrić and the pie that Mehmed Paša Sokolović took with him when he was taken to the Janissaries.

Lectures and exercises have started at the faculty. The lectures were interesting, but it could have been without Sociology and Pre-Soldier Training, the only two subjects that were compulsory and started at half past eight in the morning. The experimental exercises were held in the second basement of the former "Glavnjača" and for technical reasons were not coordinated with the lectures. The equipment was worn out, and the conditions in the laboratories were not great. During the physical chemistry exercises, I was in the group of assistant Mirjanić, who was an energetic guy in good shape, because as we found out, he practiced boxing. I didn't pass the first entrance exam, so I prepared it again. I went to the assistant to see the result and to ask about the possibility of making up for the missed appointment. I entered the laboratory and found him talking to a student from my group who was crying. I was surprised by the assistant's following comment: There you see this colleague, he pointed at me, I also knocked him down at the colloquium, but he did not come to cry. He prepared better and now he has passed the exam. Sometimes I do it on purpose, you have

to be firmer and more persistent, and science is not a rabbit so it can run away. This tip was useful to me as well.

My generation was good. About 80 of us enrolled in the studies, and the dropout was not massive. Half of the total number of enrolled students failed to meet the requirement for second-year enrollment. Some of them gradually transferred to other, easier faculties. It turned out that our generation from the 70s was one of the best in the last ten years. Most of them graduated from university.

Little by little, I got to know Belgrade. I started going to cinemas and theaters, and at that time dance parties with live music were also popular, albeit with less well-known bands. Discotheques were only hinted at.

My studies have progressed well. I regularly fulfilled all my obligations, attended lectures, gave colloquiums and did experimental exercises. The most difficult subject, Physics I, was taught by Professor Napijalo. The subject was extensive, and he spoke quickly and had a hard time stopping at the end of the lesson. I wrote everything and often my hand would hurt. He loved to draw and it refreshed us, the pictures were really flawless. He conditionally divided the course into two parts, into the first and second semesters, and took it that way, which made the work significantly easier due to the volume. In January, I passed the first part, and in June, the second, and that too early. Only the written exam was more difficult in June because it included material from both semesters. I am gaining circumstances before the written exam in June I had the opportunity to go shopping in Trieste, Italy, which was popular at the time, by train. My parents'

neighbor, a railway worker, was the head of a passenger train to Italy. He had the right to take someone on a tour for free every six months, so he offered it to me. We jokingly agreed that he would call me "son" and I would call him "dad". The only funny thing was that he was a small man and I was almost two meters tall. The trip went well, we traveled at night, I got off in Trieste in the morning, and “dad” continued to Milan. I shopped at Ponte Rosso two pairs of jeans, a sweater, shirts and t-shirts, and in the evening I waited for the train back to Belgrade. We arrived around 7 o'clock, and I had a written exam scheduled at the university at 8 o'clock. The exam was held in the VHA (large chemical amphitheater), and assistant Ristovski was on duty. I reviewed the tasks and knew how to solve them. When I was done, I turned to the assistant and asked him if everything was okay. He said yes, but in the second assignment I had a calculus error. Will I be invited to the oral with that mistake? - I asked him. Yes, he said, and I explained to him that I didn't sleep for two nights because of the trip and I went to sleep. Normally, I didn't study the day before the exam. I worked as much as I had to, and that day I would rest, try to avoid nervousness, and also because of the spell!

In June, I passed all exams, except for Mathematics I, with decent grades. I took it as well, but I did poorly in the written test, so I didn't take the oral test so as not to spoil the average. I passed it in September.

I had a lot of free time that summer. I managed to get a temporary job through the Student Cooperative. Through a cousin from my aunt who worked as an economist at Index Tourist, I went for two months - July and August - to a

student resort in Trpanj on Pelješac, in Croatia, to work as a supplier and accountant of a bar in the resort. It was heaven on earth; deserved. There is no better small place, nature, sea, forest, or better job. In the morning, I would get drink supplies, with the driver Mario, we would unload it and I would open the bar with the waiter on duty, with whom I would determine the situation from the previous day. Then we went to the beach. We had a lot of guests from Belgrade and the whole of Serbia, and there were also students from abroad, especially many Czech girls. At first I went to the beach, but later I got lazy and stayed away from the strong sun. After noon, I would crawl into the shade of the stone resort and do something. I would often take rice or beans from the cooks and clean them by sorting them and separating the grains from impurities, it always relaxed me. My main job was in the evening, making sure everything was in order at the dance we organized every other day. The next day, the party would be organized in a Zagreb resort that was nearby and had a slightly more intense rock rhythm than ours. At the end of the evening, my job was to list the drinks and determine the quantities sold, and the price that the waiter had to hand over.

The following autumn, due to the difficulty of the faculty, the "clean year" and the high average grade, I got a place in a double room in the Lola dormitory, near the Wolf Monument. There, the working conditions were better, the food was good, and I was in the epicenter of student social life. I stayed there until the end of my regular studies, and two years after that in postgraduate studies. Due to the hard work during the week, I enjoyed the "Saturday evening fever" in one of the

offered locations, be it Lola, Mašinac, KST (Club of Technical Students) or the Faculty of Technology and Metallurgy.

The studies started well and there was no reason not to continue so. Here are some tips from personal experience, for all current and future students. If you want to study successfully, follow the following five rules, preferably all in one package:
a) What you can do today, don't leave it for tomorrow, you will sleep easier;
b) Avoid idle discussions, especially if you notice that the interlocutors are making up events:
c) Try to understand the material;
d) Do not copy or cheat;
e) What Lenin would say "study, study and only study" or in a more modern version: You tell a girl you are at a friend's house, a friend that you are with girl, and you sit in the semi-darkness and read the “Capital”.

Towards the end of my studies, in 1974, I encountered programming, which at that time was in its infancy and was not in any way included in regular study programs. This is the practice of every university education as well - to lag a little behind current trends in science and technology. There were enthusiasts who, in semi-private arrangements, were familiar with and involved in the progress of electronic computing and computer technology in developed Western countries, including in our country. The attached link shows the history of the development of computing in the world and in our country, sometimes until the end of the last century: *http://poincare.math.rs/~jelenagr/1d/istorijaJHP.pdf*.

In 1974, the Mathematical Institute of the PMF received an IBM 360-44 computer, a punch card flasher. It was huge and housed in a specially cooled room in the basement of the courtyard part of the building. Although we had nothing to do with it according to the study program, the research associate of the Nuclear Physics Laboratory Vjekoslav Gerc organized a voluntary course in computing and programming in the Fortran IV programming language. Ten of us signed up. For a month, he taught us a preparatory programming course in the afternoons. It was something new and very interesting for all of us and we always stayed longer than the allotted time. Once again, we were convinced that genius is usually simple, simple things. I remember e.g. how delighted we were when we discovered how numbers can be rounded in two program lines: 0.5 is added to the desired number and the "smallest whole part" is taken from the obtained number, that's all, check!

The first digital computers used punched cards as the primary medium for entering computer programs and data. A punched, IBM, or Hollerith card is a piece of thin cardboard that contains digital information based on the presence (1) or absence (0) of rectangular holes for light to pass through, in a fixed pattern on the cardboard. The dimensions of the cards are 7.6x19 cm. Each card with 80 columns in 12 rows can be punched for 80 alphanumeric characters of data. The cards are punched using a keyboard printer, similar to a typewriter.

Each of the course participants would solve a numerical problem (e.g. solving a given equation), write a program and transfer it to cards in the computer laboratory room using a machine. The computer operator would pass the cards

through the computer, and the program would usually not work on the first try! The result of the attempt is printed on a special wide paper with marked pale blue lines, which we called "sheets". This was followed by searching for errors, typing new cards and all over again. It was a great delight when your program finally worked

Since it was in the final year of college, I decided to do my thesis - on the computer. I chose to do the performance calculation and optimization of the cycloidal mass spectrometer. Of course, those early computers didn't have any graphics. Raw numerical data were obtained, so they had to be further processed and possibly displayed graphically, which was done with an ordinary pencil on classic graph "millimeter" paper. It took several years for the development of PCs, so that working on computers became clearly more productive! Fortunately, a very rapid development followed in terms of increasing capacity, speed of work and technical support, so that today it is unthinkable to work without them. More will be said about this later. I defended my diploma thesis entitled: "Principle of the cycloidal mass spectrometer and the possibility of measuring the argon ionization cross section" in October 1974.

After graduating in physics at PMF, I had a decision to make, what to do next? At that time, students began to go abroad en masse to continue their education, mostly in the USA, but also in European countries. The more ambitious ones immediately applied to the chosen universities, filled out the application materials, asked for recommendations and took the necessary tests. I was seriously thinking about it too. I didn't want to start working here as a teacher in a school

because I saw it as an interruption of further education and learning in general, and I didn't want that. On the other hand, I knew some older students who had already gone abroad and saw the trials they encountered. Even when their school fees are paid and they get some kind of scholarship, it is not enough and they have to earn something additionally, which takes their time. The challenges were great, as were the temptations.

As sometimes before and many times later, I called for help to General Kutuzov, the commander of the Russian army in the wars with Napoleon, depicted in Tolstoy's novel "War and Peace". His way of thinking and solving problems in especially crisis situations left a very strong impression on me. As far as I remember, he would then say that the time was not ripe for imposing a solution and that only "patience and time" could solve every problem. In other words, one should have strength and patience and wait for time to impose circumstances that will bring a solution. Morning is older than evening.

I worked for a few months at the Institute of Physics in the laboratory of Professor Milan Kurepa, who was also my mentor for the preparation and defense of my graduate thesis. When the position of an assistant for physics opened at the university, in early 1975, I applied and was accepted. Then I enrolled in postgraduate studies in the field of Physics of Atoms and Molecules, with the same mentor. I felt that I still had a lot to learn in Belgrade, before going abroad. And it turns out, I was right. I started to learn the trade of an experimental researcher on the problem of the interaction of electrons with atoms and molecules, in the processes of

ionization and, the so-called, dissociative attachment. It was very interesting.

Postgraduate studies lasted two years of taking exams plus writing and defending a master's thesis. I was doing an experiment in the lab on the fourth floor of PMF and I was giving exercises from general physics courses. Two slightly older colleagues, Nada and Lidija, worked alongside me in the laboratory. The relations between us were good, we were all open and committed to work. I was in the minority and a gentleman so I accepted everything that was expected of me. Right at the beginning, I managed to eliminate possible tensions that could arise due to female-male relations. I adopted the principle from an early age that it is not good to mix business relationships with possible emotions, and I always stuck to that, except when I could not avoid it. In order to achieve this, I often repeated to my colleagues a joke that I had heard back in my regular studies. In physics studies, most were men, but there were also a few girls. Since we were in the majority, they had to accept our model of behavior. They were not careful how they expressed themselves, they could swear, and they were prone to tell fat jokes. Among them, Bosa stood out, a small manly but bright person from whom we all learned an instructive and relaxing joke. Vic says: The father had two daughters, one was beautiful in p.m. (very much), and the other went to study physics! Nada and Lidija accepted it, although they were not typical physicists and they laughed.

I liked the work I was doing, I mean the experiment. Electrons were emitted from a heated tungsten wire. I accelerated them and brought into the collision chamber

using a trochoidal electron monochromator (TEM), where they collided with the atoms and molecules of the gas under investigation. Everything was contained in a stainless steel metal tube that was under vacuum. Different processes occur in the collisions of electrons as elementary particles with more complex atomic particles. During these processes, among other things, positively or negatively charged particles - ions - are created. Ions are detected using sensitive electrometers and the effective cross sections are measured, i.e. probability of their formation as a function of electron energy. The charge of one electron is small ($1.6x10^{-19}$ Coulombs), and the effective cross sections are of the order of $1.6x10^{-16}$ to $1.6x10^{-20}$ cm^2, so their determination requires sensitive instruments and extremely stable and controlled experimental conditions. In other words, you should be armed with attention and patience.

I quickly got to know the apparatus and started working independently; I considered it more like hanging out with the experiment than work. I concluded that it is necessary to invest a lot of attention and ensure stable working conditions of each part, without sudden changes and extreme shocks, when turning on the device, gradually establish stable working conditions. It seemed to me that it should be treated like a living being. If the conditions change suddenly, for example when the emission filament is heated, the pressure is disturbed and the reproducibility of the measurement is lost. That's why the experiment sometimes succeeds and sometimes it doesn't, that's why someone is a better experimenter than someone else. I especially noticed that later on with more complex experiments that I did.

I did the measurements first on inert gases, and then on halogen elements that under normal conditions were in a liquid or solid aggregate state, through evaporation or sublimation by changing pressure or temperature. I focused on the processes of dissociative capture of electrons that were resonant, which means that they took place only on some so-called resonance energies. They appeared as narrow structures at given energies that had the form of maxima or peaks. Of particular interest was the case of the chlorine molecule, Cl_2, which had a peak near zero electron energy. The most difficult thing was to produce low-energy electrons, so I worked hard to increase their yield. To that end, I heated the emission filament less and kept all voltages at low values. The lower the energy is the higher is the yield of chlorine ions. I managed to "extract" a cross section of about 200 standard units, i.e. so many times higher intensity than the other peaks. It turned out to be very important for the development of the so-called excimer (excited dimmer) lasers. Later developments showed that the applications of these processes are also significant for seeding clouds with rain seeds, and their role in the breakdown of stratospheric ozone and the development of a special type of biological weapon was also speculated. But, be that as it may, my mentor was excited by the results and once said that I was an expert in little spades, he even gave me a nit name, "Sandokan for Spades".

I got my master's degree at the beginning of 1977, with the thesis: Absolute cross sections for ionization and capture in the collision of electrons with molecules and mass analysis of ions.

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In the same corridor, the third door from my laboratory was the office of Prof. Aleksandar Aca Milojević. He was a senior professor, already about to retire, a participant in the Spanish Civil War, influential and politically engaged. Otherwise, he was a nice-looking gentleman, with constantly half-down eyelids. He had lunch at "Komunalac" where he had reserved a table, and he also engaged in diving and underwater fishing, which I saw at a scientific conference in Dubrovnik, the first in which I also participated. He liked me because I was constantly hanging out at the university. I remember one time when I started working; he met me in the corridor and asked me to jump across the street to the bakery, held by Spasa, to bring him a quarter of burek with cheese. I said I was doing something but the burek would arrive soon. I went into my lab, found Dule, the technician for student experimental exercises, gave him some money and asked him to buy a quarter of a burek with cheese and take it to Aca. After 15 minutes Dule came back and handed me the burek money I gave him. I took a burek to Aca, he said, and he gave me the money. It's okay; keep this money for yourself because you were quick. Aca later thanked me and from then on he sometimes sent Dule by himself for burek.

After my master's degree, when we met in the hallway, prof. Aca stopped me and, with little preparation, asked what I was

going to do next. I said I baked a craft here, and I was just thinking about it. He invited me to come to his place the next day. We sat down and he told me that he had spoken with the cultural attaché of the French Cultural Center in Belgrade. He said that there was a possibility for me to go to Paris at the Sorbonne, that there was also a small scholarship and that I should think about it. I was like a loaded gun; I have nothing to think about. The only problem is that I don't speak French, I studied German for eight years at school, I said. Okay, you will discuss the details with the attaché; go there tomorrow at 12 noon. And now I'm going to teach you 50 words in French in 3 minutes. You know from literature English terms and words such as: electron, energy, but also ionization, excitation, dissociation... Now, just instead of the suffix "ation" (eishen) say it with the suffix "asion" and he will pronounce them for me, albeit with a sarcastic smile and bad accents. That's how it goes. I see, I said with a sour smile.

The attaché was a young man, disheveled and wearing a tie, a typical intellectual, an official from French films. He slowly explained to me, in bad Serbian with a few French phrases, how his mission is to spread French culture and the most melodious language in the world as much as he can. He is deeply convinced that I will successfully overcome the language barrier, they will pay me, in addition to the scholarship, a three-month or six-month French language course, and this is guaranteed to be successful when someone lives and works in France. He was kind and likeable. I mostly nodded my head and said: *Oui*. *Oui*… At the end we said goodbye, he gave me a bunch of forms in French and told me to bring it when I filled it out.

I left the French Cultural Center, walked a little along Knez Mihailova to get some air and crossed Zmaj Jovina Street to Jugoslavija Film. Mira from the trip from Russia was waiting for me there. I handed over the papers to her and we agreed that I would pick them up in two days.

I met the future boss in Paris the previous year at the ICPEAC conference, which was held in Paris. His name was Richard Hall, Dick for short. He was born in England, and studied, lived and worked in France. He was a postdoctoral fellow with the then famous Trajmar at the JPL laboratory in Pasadena, Los Angeles. Before me, Dick already had a PhD student from the Institute of Physics in Belgrade, so things were well established, so to speak. Due to the language, as well as the complex conditions of study, language barriers and administrative procedures, it was agreed that I would do the experimental part of the doctorate in Dick's group at the Institute in Žisje (*Jussieu*), according to the established program, and that I would formally defend the thesis in Belgrade, with Dick being involved, as a full member of the commission for the defense of the doctorate, when it is completed.

Of course, I was very impressed with Paris. During the said conference, a gala dinner was held in the famous Hall of Mirrors in the Imperial Palace in Versailles, which is breathtaking. From the tour of the castle to entering the Hall with gilding, paintings and mirrors on the walls, with waiters in tailcoats and gloves up to the elbows, everything was very impressive.

A few more words about Dick, he was tall, English type charming, with long straight blond hair, he looked a bit like Rod Stewart, and he loved Duran-Duran. At dinner the ladies were in chic gowns, we gentlemen in formal suits, and Dick was in new jeans, cotton white T-shirt with a red bow tie printed on it and a black jacket with a white rose on the lapel. The only complaint about the dinner was the lack of food in relation to the number of attendees and the crowd around the served buffets, so that was left to be talked about at subsequent conferences. At one point, on the table in front of me I noticed an oval on which lay a golden-yellow roasted turkey. An idea came to me. I looked towards our table, next to my seat was my mentor Kurepa. When our eyes met, I positioned my hands as if I were holding something, raised my hands and asked him with a look if I should bring the turkey. He smiled and nodded his head. There was a waiter next to me, when I wanted to address him, he politely and discreetly turned to the other side, letting me know that he did not want and was not allowed to participate in the operation. I took the oval and carefully carried it to our table. Everyone at the table helped themselves, and then guests from other delegations arrived. Later, at the ball as I turned around to the sounds of the waltz, they would sometimes smile at me and nod his head in support, like a brave and resourceful conqueror of the turkey.

In Paris, I lived relatively close to the institute, on Rue des Feuillantines, in the Latin Quarter on the left bank of the Seine, near Luxembourg Park, and I walked to work. I passed through the colorful fish market in Rue Mouffetard, where there was an abundance of seafood and sea fish, which were

cut and cleaned on the spot. There was a lot of noise, everyone was busy, and the surrounding streets were filled with the strong smell of fresh sea fish and spices. In Paris, wherever you go and wherever you turn, you come across interesting places, strong smells, rich traditions and sights.

Due to the proximity of the English Channel and the Atlantic Ocean, the weather in Paris is very changeable and rain is very frequent. During one day, periods with and without rain alternate several times. This bothered me at first, almost regularly during lunch in the university restaurant, there would be a downpour. It used to be said - if you don't like the weather in Paris - wait a bit.

The institute was new, right on the banks of the Seine, pavilion T12-E5, and the laboratory was on the fifth floor with a view of the Seine and the Botanical Garden. The laboratory was spacious with two apparatuses; I worked on the one closer to the windows.

Here I am finally at work abroad, which I have been dreaming about for the past couple of years. I felt that I was ready for new challenges and that now was the right time. In Belgrade, I learned what could be learned, and this was the new so-called quantum leap. I understood this from the research subjects, I moved on to finer processes, to the vibrational and rotational structure of polyatomic molecules. At the Faculty in Belgrade, we somehow "dropped out" this field of physics. We had the Atomic Physics course taught by Professor Mira Jurić, an old staff member taken over from Vinča, but there she dealt more with nuclear physics. At the end of the semester, she devoted only a few hours to

molecules, and she taught vibrational motion for half an hour. I remember exactly that she just visualized the vibrations by spreading and contracting her arms like butterfly wings. Here it was done more completely, and on the shelves in the laboratory, among other things, there was an edition of three books by Herzberg with the theory of vibrations and complete tables of vibrational and rotational transitions based on a series of measurements in the NBS (National Bureau of Standards) laboratories in the USA. That NBS could be the next stop on my way!

Immediately after my arrival, I was enrolled in a three-month accelerated French language course at an institute not far from the Sorbonne. I had classes every other day for two hours in the morning. A nice professor with striking teeth and wrinkles around her mouth, her lips curled into a constant smile and gesticulations that successfully accompanied her presentation, had pictures and other props on hand. She spoke only French. I understood everything she said and I stood out in the group. It was not difficult because there were many nations in the group, and the Chinese and Japanese had the hardest time managing. I also tried to speak in French in the laboratory, except exceptionally when I used English or German. I was noticing progress. On one occasion, during a coffee break, we got together as usual and chatted. I also said something, and Joayez, who was standing next to me, without much thought told me not to poop (merdez pas), to which I responded in French that I was just chatting. He didn't expect that and just nodded his head in approval. He was actually a prankster. They told me that the previous student from Belgrade, who would politely wait for everyone to leave,

sometimes pressed the button for the second basement and to close the door in the elevator, and he would end up in the basement. He didn't try it on me because I was much bigger than him. I decided that I had mastered the French language enough when I started making jokes in it. An electronics technician, Momo, once asked me if we had electronic transistors. I said that they existed, but that they were made of wood, at which everyone present laughed. Then I told Dick that after three months I wouldn't be taking the class anymore, because speaking with them in the lab is enough for me to progress further, and in those classes I waste a lot of time listening to Chinese and Japanese struggling with French pronunciation. He agreed.

The experiment I worked on was far more complex than the one in Belgrade. These were electron-molecule collision processes, but it was done with electrons of high energy resolution, which were obtained using a cylindrical analyzer, Hughes-Rojanski, of 90^{o}. The formed negative ions from the dissociative process were detected after selection with a double Hughes-Rojanski cylindrical analyzer, each of 127^{o}. The scattered electrons are prevented from the detector by the application of a weak magnetic field, which is formed by the current through a locally placed small solenoid. Spectra of the dependence of the number of ions on the incident electron energy (CRE) or kinetic energy of ions from dissociative capture (ELOSS) were recorded. The angular dependence of the scattered ions was also observed by rotating the detector around the collision center. A multi-channel analyzer (MCA) was used to select the measurement mode, and a channel electron multiplier (channeltron) and NIM (nuclear

instrumentation module) electronics were used to count ions. Therefore, all parameters of the collision were controlled and a complete picture of the collision was obtained. This kind of experiment was started by Dick at the JPL laboratory in the USA, where he did not manage to complete it. In order to increase the resolution and enable a better analysis, the test gas was introduced into the collision area using a multicapillary tube with a bundle of narrow capillary metal tubes with a diameter of the order of 10 microns. It was intended to direct the gas better in only one direction and thus reduces the component of the thermal velocity of the molecules in the normal plane. In this way, the speed of the molecules is significantly reduced, the gas is effectively cooled and the energy resolution is increased. It is possible to accurately measure small changes in the energy of scattered electrons and ions, that is, to detect a fine structure in the energy spectrum of molecules. It was a great challenge and one of the first such attempts in electron spectroscopy.

I quickly became familiar with the parts and modes of operation of the experiment and soon obtained results that were promising. I applied the experience from Belgrade and tried to work continuously in longer time intervals in order for the apparatus to achieve stable working conditions. I also stayed late into the night, it was most convenient to work in the evening. There were not many people in the building, the power supply and temperature conditions were stable so that the resolution of the experiment was increased day by day. I would get carried away sometimes and not notice anything around me. Late one night I got a strange feeling that someone was watching me. There was complete silence,

except for the monotonous sound of the mechanical vacuum pump, I hesitated to look around, but out of the corner of my eye I saw that the front door was half open. It was dark in the corridor, and at the very entrance I saw two rows of large white teeth and eyes. I winced and went cold at the same time. A black man in a dark uniform was standing in the corridor. My stiffness was transferred to him. A few seconds passed before I moved, and he stood frozen. I nodded and he answered. I realized it was the building's security guard on his regular night patrol. He apologized profusely for acting like that; he should have announced his presence in some way. This did not happen again.

A few days later, my tungsten filament, a wire that allowed the emission of electrons when heated, burned out. I had to replace it. A student who was in the laboratory on an internship came by and asked me what happened. I explained to him that the filament had burned out. It happens from time to time. As with an ordinary light bulb, the material gets tired and wears out and eventually burns out. I looked around the lab for a spare thread but couldn't find it. A student came by again and asked me again how the thread burned. He was from North Africa and spoke French well, but he did not understand what had happened. I explained to him once again that the thread had burned out and that this happens. When he asked me the same thing a third time later, I had to give him a more convincing explanation. I told him that one huge electron, bigger than the others, came across and hit the thread and broke it. Hm, he said, he remained thoughtful for a moment, then turned and walked out of the lab. About ten minutes later, Dick enters and says to me: Dragan, where is

that big electron, I would really like to see it. Of course, all electrons are the same and Dick understood that I was joking.

We did not find the spare thread; it seems that they were all already used up. We found a box from its packaging, the date was earlier, but the manufacturer's address was also printed, it was in the northern part of Paris. I got on the subway and went to find threads. However, there was no company at the given address, even the building was demolished and they were constructing a new, higher one in the same place. I looked around and asked a woman from the neighborhood what happened to the company and where it was moved to. She hardly understood me, and I didn't understand her at all. Word by word I understood that she was a foreigner and not very familiar with French. It turned out that she was originally from Boljevci, one of the villages on the banks of the Sava from the beginning of this story. Her family came to France a few years ago. She is a seamstress and sews quilts. It turned out that twenty years ago she also sewed a quilt for my mother in Zabrežje. We concluded that "the world is so small".

I didn't want to waste a lot of time, there was no Internet or Ali Express then, so I decided to make a new thread myself. They got me some 0.8mm tungsten wire and I turned on the spot welder. I practiced some thread bending and spot welding. The thread was a simple thing, a sharply bent tungsten hair pin with additionally bent legs. It was spot welded to two thicker supports fixed on a ceramic disk. I used a disk of old damaged thread, and I practiced bending the thread from the minimum number of strokes so as not to damage it. I made 3-4 strands and chose the best one. The

main thing then was to weld the thread to the supports freely, without the slightest tension, so that it does not break when heated. In the evening I finished the thread and its assembly in the vacuum chamber and turned on the system to pump out. In the morning I turned on the experiment, the thread worked and I could continue the measurements. Since then, I have been in charge of thread making and for other experiments. They called me "the master of threads" and jokingly called me the king of threads (*le roi des fil*).

Although the work was intense, there was also time for fun. Some exhibitions and concerts were held constantly. I met a colony of younger painters from Belgrade, Cile Marinković, Ljubica Mrkalj, Zoran Rubens at Bozar (*Beaux arts*), and also some musicians. The activities of our artists were related to the Cultural Center of Yugoslavia, which was located in the 4th arrondissement. Literary evenings, exhibitions, solo concerts were organized. I went there with Cile. He knew people and they would always scratch for a bottle of whiskey or a box of good cigarettes. Then they would continue hanging out with one of us. One evening, I met a certain Nesha, who worked at the Beobank branch in Paris, in the business of saving and transferring the money of our people in France. Word by word, it turned out that Miodrag Belic, the famous Mika Francuz from Zvezdara, was working with him, who was my cousin, my uncle's son, originally from Zabrežje, the third house from my parents. That's how Mika and I met in Paris. We spent the next weekend together, walking around town, drinking pastis, evoking memories and listening to Jacques Brel, Aznavour and other great chansons on his gramophone. In the cultural center I also met Bosa, the

already mentioned colleague from the physics studies. Since then, the four of us have been hanging out a lot, with Nesha being in charge of the cooking and especially of the fish specialties and mussels mul-de-Spain, as well as the white wine. He had a special curved thermometer because the white wine had to be chilled to 10-12 degrees. Bosa was an expert in home-made filled pancakes. We affectionately called it Barefoot Pancake among ourselves. Mika had a car in Paris, a blue Peugeot 204 with a sunroof. That came in handy for our nights out. I remember one weekend at night we visited a bar, then a night club on Pigalle and Mika, Nesha and I were returning in the wee hours along a wide street. Other rare drivers flashed their lights and honked their horns. I pulled Mika's hand and told him to stop. I realized that we were driving in the wrong direction on a one-way street. We turned the car around and fortunately passed without any consequences - this really happened. Some years later, I heard the following joke: Muyo and Haso are driving in their car and listening to the radio. At one point, the presenter stops the music and gives a warning - a car has been spotted driving in the opposite direction in such and such a street. Muyo looks out the window and says to Haso: It's not one, painful; everyone is driving in the wrong direction.

Sometime in May of that year, a strike, or rather a protest broke out at the University for environmental reasons. I didn't even know for sure what it was about, then. Students and staff stopped classes for a week with the intention of pointing out the potential danger of embedded asbestos in the building's heating system and thermal insulation between floors. It was then that it was discovered that asbestos is a

very harmful material for health and that it can cause cancer of the respiratory organs. And indeed, on the ceilings of the rooms, a white material perforated with small openings was seen, which was slowly crowned, and on the work surfaces early in the morning, especially after the weekend, before cleaning, a thin layer of white powder was seen. The French were normally left-wing and often went on strike. This was a valid reason and the authorities soon accepted the request to remove the asbestos sheets and replace them with some inert and harmless materials. It was done in a very short time. That's when I started thinking about ecology. I later designed the course, e.g. course on that topic and started teaching it to students majoring in applied physics at the faculty in Belgrade. I found the topic very interesting and that physics offers great opportunities for detecting pollutants as well as solving environmental problems using various physical methods. Since there was no literature in our language, I later wrote a textbook titled "Physics and Ecology".

The new thread on the experiment worked perfectly. I was getting more current and it was more stable than before. I already had enough experience and intensified my work on measurements, including ones for a long times, sometimes all day and all night. When the experiment was running and all the parameters stabilized, I was sorry to stop and I tried to make the most of it. Dick was used to always finding graphs with new results on my desk when he came to work. He got used to it so much that he even stopped looking, it became normal and I saw that he gained confidence in my work. Then we met occasionally to discuss the results and possibly see what could be done next, what could be improved with

better statistics and in which direction we should continue. The focus was on recording the energy spectra of H- or D- negative ions formed by the processes of dissociative capture of electrons at a given incident energy. These are the so-called energy loss spectra. Assumed results for distributions were obtained for the excitation of water molecules in the gas phase and "heavy water" molecules, which have two deuterium atoms instead of hydrogen, labeled D_2O. Heavy water has been procured from the company NORSK HYDRO from Norway, which they say was founded when the Dane Nils Bohr worked on the problem of describing the atomic and nuclear structure, for which he received the Nobel Prize in 1922. We only had one pack of heavy water of 50 milliliters in the special original packaging. The water was in a heated glass ampoule that was lined with paper and enclosed in a capsule made of stainless steel. The capsule was closed with a screw cap, which was engraved with a stylized Viking Age sailing ship. Everything was placed together in a square wooden box with a lid. The described packaging was preserved and I brought it with me as a souvenir when I returned from Paris.

The spectra of negative ions had a maximum at energy of several eV and at lower energies a characteristic structure in the form of peaks of decreasing intensity that corresponded to the vibrational excitation of neutral radicals OH and OD. These peaks were asymmetrically broadened towards lower energies due to the rotational excitation of the radicals themselves. I was able to accurately reproduce the resulting structures by computer modeling, using Herzberg table data for vibrations and rotations of OH and OD molecules. It was

again shown that the best resolution of the spectra is obtained under stable working conditions, at a stable temperature of the electron source, stable pressure and laminar gas flow conditions through the multicapillary screw into the collision volume. The measurements were automated. A multi-channel analyzer was used for that. It was not programmable, but it had the ability to choose combinations of data collection in several modes of operation, which satisfied our needs. In the selected mode of operation, a certain interval of energy was sweeped and it was possible to register the pulse counts on the channeltron in appropriate time steps. It even had a small monochrome (green) screen for real-time observation and allowed visual control of the shape of the measured spectrum. The registration of one spectrum depended on the number of pulses, but a couple of hours were enough for good statistics. Energy loss spectra were measured for several incident electron energies in order to see the complete resonance for each of the dissociative absorption peaks. These measurements were completed in a few weeks.

Then we measured the angular dependence of negative ions scattering. The possible range of changing the detection angle was in the interval from 0^o to 130^o in relation to the direction of the incident electron jet. The angle was changed manually, mechanically using a system of fine gears in steps of 5 degrees. The angle could be changed in both directions, clockwise as well as counter-clockwise. This means that in order to measure the angular distribution at given energy, it is necessary to record 26 energy loss spectra, with the fact that the recording is performed in a narrower range of energies around the selected maximum. Of course, it is always

necessary to repeat the measurement by turning the detector in the opposite direction to check reproducibility. These measurements are relative and more difficult because the entire series must be performed under the same experimental conditions, e.g. with the same electron current and at the same pressure. It worked best in calm evening conditions. Therefore, it took a long time to complete the measurements for each peak and for each detected ion, meaning H^- and D^- ion. Later, the analysis and comparison of the obtained results followed with the aim of determining the existence and magnitude of the isotopic effect for the two observed ions.

This was the first part of the experimental program of my work in Paris. There were no other experimental results for comparison. There were only some calculations of the potential energy of the interaction of particles in a molecule, that is, of the 3D potential surfaces of molecules in excited states. Qualitatively, our results agreed with each other, e.g. they confirmed the dynamics of dissociation.

The second part of the research was the examination of the behavior of the process of dissociative capture of electrons on molecules in excited electronic states. It is planned to perform the measurements on the $a^1\Delta_g$ metastable state of the oxygen molecule O_2. An excited oxygen molecule is produced in a microwave gas discharge in an oxygen atmosphere. For that, the previous apparatus had to be significantly modified. A device in the form of a cross was made from glass tubes with side-heated electrodes to which the lines of the microwave generator were connected. Oxygen was introduced through a vertical glass tube. When the generator was switched on, a bright red light was produced between the electrodes, which

were somewhat weak due to the low pressure. It was a sign that part of the oxygen molecules was in an excited energy state (about 20%).

In these measurements, negative ions of atomic oxygen resulting from the process of dissociative absorption are detected, similar to the previous measurements. Without the microwave generator on, in the spectrum of constant residual energy of 1.5 eV, two oxygen peaks are obtained as a function of the electron energy, with maxima at 5.7 eV and 7.6 eV. In the spectrum with the microwave generator turned on, in addition to these two, a third peak with a maximum at 6.7 eV is obtained. This third peak is of even greater relative intensity and arises from the fraction of excited oxygen molecules in the $a^1\Delta_g$ metastable state. This is proven based on the arrangement of the potential curves on the potential energy diagram of the molecule.

So, the signal has been received. This was followed by the usual measurements of the so-called spectra of so called excitation function and angular distributions of the generated negative ions. It took a lot of time because for each spectrum a correction had to be made to the ratio of the number of excited molecules to the total number of molecules in the ground energy state. Excitation functions of dissociative electron capture were measured for two dissociative limits with the maxima at 5.7 eV and 7.6 eV. For both processes, the angular distributions were determined and their maxima were normalized at 90o. The presence of the $^2\Pi_u$ resonance of the negative state was confirmed, and based on the theory of O'Malley and Dunn and these measurements, the existence of

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PROFESSEUR CLAUDE MAGNAN

PARIS, LE 7 Juillet 1976

To whom it may concern,

For the one year stay of Dragoljub BELIC in our laboratory an ambitious work program composed of two seperate projects was proposed. Firstly, the observation of the energy and angular distribution of H^- (D^-) produced by dissociative attachment of electrons to H_2O (D_2O) and, secondly, the observation of dissociative attachment of electrons to metastable oxygen, the letter specie being produced in a micro-wave discharge.

I must say that, much to my surprise, this program has been completed in a very short lapse of time. The reasons for this are twofold : first, Dragoljub BELIC has worked extremely hard, spending many nights taking data on the instrument. Second, the modifications and particularly the micro-wave device all worked first time and very little time was lost. Of course, the theoretical interpretation of all these results still remains.

I am very impressed by his accomplishments and consider him to be a first class experimentalist. We would certainly be very happy to see him back with us.

R. J. Hall.

Richard HALL
Maître de Recherche au C.N.R.S.
Responsable de l'Equipe de Recherche Associée
n° 703 du C.N.R.S.

a new resonance was determined, for which the symmetry and term of the $^2\Sigma_g^+$ state symbol were determined. The shape of the angular distributions was successfully fitted with existing theoretical models.

The planned program of experimental work was successfully completed a little before the planned deadline. Preparations for the return to Belgrade followed, where extensive work on theoretical and computer processing of the obtained measurement results awaited me. I returned by train, the same way I came, a journey through Switzerland and Austria, all day and night in the cabin of a couchette car. Mika, Bosa, Nesha and another friend, a student from the Ivory Coast, accompanied me to the *Gare du Lyon* station. Mika was dragging my big chained suitcase, and Nesha was carrying a bottle of drink for a happy trip.

This journey from Paris to Belgrade was part of the route of the famous Orient Express passenger train, described in Agatha Christie's classic work: "Murder on the Orient Express". The train was created by the Belgian Company in 1883 and connected the north-west of Europe, Paris and London, with Istanbul and Athens, changing routes at different time periods. Now I had a little more time to draw some parallels with part of my own life path.

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From my return from Paris until the end of the year, I continued to work in Belgrade; it seems to me at an even faster pace, on finishing my thesis. At the same time, I moved into a new apartment in Block 70A, which I bought through the University Housing Association, on a long-term loan under very favorable conditions. At that time, I was also waiting to go to the JNA to serve one year of military service. I had a lot of commitments. In addition to all that, I also had regular work duties in teaching. I gave experimental exercises for general physics courses for students of physics, physical chemistry, chemistry and molecular biology.

I was in regular contact with Dick. We collaborated, on the one hand, on the processing and interpretation of experimental results, and on the other hand, on the preparation of final results for publication in leading international scientific journals. The work progressed well and I tried to bring everything to an end by the end of the year, while writing my doctoral dissertation in parallel. We planned to defend the thesis in the second half of January next year, and it was agreed that Dick would come to Belgrade on that occasion.

I received my doctorate on January 19, 1979th with the thesis: "Energy and angular analysis of negative ions from the process of dissociative capture of electrons on triatomic and

excited diatomic molecules. Polar dissociation.” The defense of the doctorate was held in a crowded Physical Amphitheater on the 3rd floor, a "ticket more" was requested. Most of the colleagues from this field from the faculty and from the Institute of Physics were present. But there were many relatives and friends who surprised me with their arrival, word of mouth spread.

The next week I joined the army. Before that, there had to be a festive send-off, as was the custom in our region, on the weekend before leaving, with a large tent and music. I didn't even try to talk my parents out of saying goodbye party, because I was sure it wouldn't work. Besides, I was so tired from working both in Paris and Belgrade that I didn't have the strength to resist. I couldn't wait for that to pass and to finally take a breather in the army. Usually boys didn't like going to the army, but I couldn't wait to get a good rest.

There were over 100 people at the farewell. Of course, so was Dick. There were colleagues from the faculty and from the Institute, colleagues from my studies, my girlfriend at the time with her company, friends and acquaintances, and most of all there were relatives and neighbors from the village. The entire large neighborhood around our house was predominantly Belic’s, and I had good relations with everyone. A large tent was set up in the yard, with two rows of tables in case of rain. For a couple of days, everything was prepared, cooking and baking. The hired music was from the nearby Gypsy settlement "Music colony", led by accordionist Bulja, violinist Panto and bassist Trokan, whom I also knew. It was cold, the month of January, so the most popular brandy was boiled from a pot that was on a constant fire outside, and

it was also drunk cold brandy. It was cheerful; everyone was drinking and dancing “kolo”. After a couple of brandies, Dick started dancing himself. As I passed by, I saw that he was drinking boiled brandy from a large glass, but occasionally cold one from a small glass. I asked him why he was mixing, he would get drunk quickly, and he said that's how they offer him and he doesn't know the customs. He continued to do so, but did not get drunk. During the breaks from playing kolo, a song was also heard, a folk song, of course, a cheerful “Becarac”. Anyone who orders a song requests that the music convey congratulations and greetings for a happy departure to the army. Dick didn't understand, so he asked me what the music was saying. I translate a couple of announcements for him, and he says that he thought this was a celebration related to the doctorate, so he stopped the music and asked our colleague Čadež from the Institute to convey to them that they should also send a congratulation for the doctorate, which they did, accompanied by applause. The party continued until late in the evening. Dick left the next day, and in the following days I went to do my military service in Kruševac.

Kruševac had three barracks and a significant military industry. I was assigned to the LPA (Light Anti-Aircraft Artillery) of the infantry garrison in Zakićevo, right next to the Military Industry of “Miloje Zakić”; only a wire fence separated us. There were few houses around, and there was also a training ground with a small stream and a shady grove. The barracks had several pavilions where the army slept, 15-20 soldiers each, in bunk beds. The conditions weren't luxurious, but it suited me just fine. I liked the peace and

discipline, there is not much to do, and there is no much thinking, everything is provided for you. I was the oldest in the barracks, apart from the chief, and I also had an academic title, so I didn't expect any surprises. I fit in well with the kids, and I also had 2-3 friends for chess, sports practice and going out in the town. I also knew how to sometimes use authority to resolve minor misunderstandings among soldiers.

Captain Zika was quite correct, and the commander of the barracks, Major General, had a spoiled son who did not want to study, so he hired me to give him a few lessons before the control exercises. Because of that training, I usually didn't go on field exercises that were a little more strenuous. Otherwise, I had a day out on the town whenever I needed. And in my unit, anti-aircraft, I gave a series of lectures on the subject of oblique shot and the ballistic equation of motion of a projectile after firing from a weapon. I was also good at shooting with a rifle, on one live ammunition shoot I earned the soldier's "Very good" from the captain, to which I instinctively exclaimed "I serve the people"! That, among other things, earned me the "Exemplary Soldier" badge, which meant shortening my military service by 15 days.

When I was informed that I would be serving the military term in Kruševac, I found out that my group in which I previously worked at the Institute of Physics had a project with VI “Miloje Zakić” for the development of a fluorescent detector for sulfur dioxide SO_2, which checks the quality and tightness of valves on protective masks, i.e. gas masks that they produced in that industry. I got acquainted with the development of the detector and agreed on cooperation in this regard. It was useful to have someone there, in case of minor

testing and installation of devices. I was already on the spot when the IF delegation headed by Kurepa, Čadež and Lepša Vušković came to Zakićevo for the first time. Development engineer Đelić received us and introduced us to the development of a new line for the production of masks and the expected automation of the process.

The first impression when we entered the hall for the production of gas masks was the strong smell of ammonia from the testing of rubber parts of the mask, the so-called cheek piece that is put on the soldier's face. Or, it is more correct to say that it was an unpleasant smell, that is, a stench. The hall was large and several dozen workers worked in it. We asked Mr. Đelić if the concentration of present gases is measured there, specifically NH_3. He showed us a gray box that was attached to the central part of the wall just below the ceiling. He said it was a detector installed by the equipment manufacturer when the production line was installed. That detector was working in the testing phase, before full capacity production began. It started to malfunction very quickly, when it was turned on, it emitted a high-frequency squealing sound that bothered people. They reported it to the manufacturer, who inspected it and determined that the detector was correct. When they restarted the line, the beeping continued. They got their hands off it, simply unplugged it and continued to work. It is obvious that the detector was not broken, but the concentration of NH_3 was above the permissible limit.

A very reliable and selective fluorescence method was chosen for testing the valve. Human breathing was simulated with the help of switches and a vacuum pump in one chamber.

One valve at a time was automatically fed to that chamber by a circular belt. Incident UV light from a deuterium lamp, with a wavelength of 213.8 nm, is passed through the chamber. If SO_2 molecules are found in it due to a valve leak, they are excited and emit a fluorescent band of light with a maximum at 320 nm. When the photomultiplier detector registers this band, it means that the tested valve on the chamber is defective and is rejected. Working on this innovation was very interesting.

I went out into the city on average once a week. It happened several times that we relax a bit, drink some beer and if nice music happens, we forget about the time. Once, a military police patrol took me into custody and I slept in "prison" in a small room at the porter's office of the barracks. It was no different from a bed in a dormitory. When an old soldier went home, I was assigned to his place in a military club equipped with basic equipment to play music and news over the loudspeaker during lunch and dinner. Before going to dinner, I would greet the cooks and play the then popular song "Ramo, Ramo, my friend", because all the cooks were mostly Shiptars. At the table in the dining room, a large and well-chosen dinner would be waiting for me. There was also a scratched tape recorder in the club, but in working condition. After returning from the camp, I conducted an interview with the commander of the barracks, in which it was pointed out in selected words that the camp was successful. I took the recording to Radio Kruševac and they broadcast it the following week at lunch time, so the whole barracks heard it.

After the completed training, a new class of soldiers came to the barracks. We old soldiers had less and less

responsibilities and more free time. It occurred to me to devote a little time to an old hobby - painting. Even during my studies, I was friends with some painters; I went to their studios and used some of their discarded canvases and paints. I liked it so I got my own material. Sometimes the will would seize me and I would try to work for days. I learned to stretch the canvases on the frames, to prepare the primer, the base and to mix and thin the colors. In Paris, I socialized with our young painters and visited exhibitions, but I didn't have time continuously to deal with it. Now was an opportunity, I decided to get a little active in one corner of the club. I bought a small package of oil paints, linseed oil, and varnish thinner. The main problem, the lack of canvas, I solved by making frames from some battens, and on them I used old discarded tent wings instead of linen. They were gray-olive, green in color, but I easily turned them into white, perfectly acceptable canvases on one side using a primer and a thicker layer of zinc oxide. The background of the canvas was still green. First I painted a bare-backed girl with a lush braid, a reproduction of a picture from candy pack. She was beautiful. However, that picture was quickly stolen from me. Then I started painting still lifes, landscapes and, from memory, motifs from the sea. I guess I missed that and I enjoyed it now. Once I was surprised by a junior lieutenant, he was on duty and stopped by the club. He looked at the pictures, questioned me a bit, and turned one of the larger formats from the back, which was green. He recognized the color but saw that it was an old damaged tent wing. He did not comment on anything or ever talk about it. I took a dozen

pictures, some I sent home when I had visitors and I still have them today.

Due to the award leave that I received as an exemplary soldier and two unused regular leaves, I had a shortened military term, so before the end of the year I shaved off my mustache and returned home. All in all, I enjoyed this time, I had a good mental rest and I was ready for new challenges.

Since its foundation, the Institute of Physics has been located in the PMF building on Studentski trg in Belgrade. It was in the added annex on the 5th floor of wing C and partly on the 4th floor of the Department of Physics, later renamed the Faculty of Physics. Thanks to the proclaimed trend of the government on the application of science in industry, it made rapid progress in development and in terms of the number of employees. For several years, IP tried to get a bigger work space and finally, thanks to the new big jobs of the employed physical chemists and physicists, it got a new space at the location of the old brick factory in Zemun, on the very right bank of the Danube, upstream from the Great War Island. The space on Studentski trg was partially returned to the Faculty of Physics, while the Institute for General and Physical Chemistry remained in it. Thus, the laboratory where I did my master's degree again belonged to the faculty, and the equipment of the research team of prof. Kurepa was moved to Zemun. I was permanently employed at the university and could choose where I would do research - whether in a new space with old equipment or in an old space without equipment. Despite all expectations, I decided on this second option.

Instead of going to Zemun, I stayed at the Student Square, which meant that I needed to develop some new research problem and to fight for suitable research equipment with which to start the work. I have decided to be independent and free in choosing a new topic, regardless of the fact that it will be neither quick nor easy. This choice reminded me of my father, who refused to work for a large company and was left to manage his own destiny. I was alone and to begin with, I submitted a request to the faculty that the given laboratory be arranged, the walls painted, and the parquet floor scraped, since it was in a bad condition. I also have a little bit of equipment left over that previous users have judged they won't need.

Colleagues at the university were skeptical that I would be able to do something on my own, but the die was cast!

At the beginning of the year, for the Easter holidays, the faculty union organized a tourist trip to Paris, a five-day bus tour with three nights, organized by Putnik. I signed up and arranged with Dick to visit him in Paris. The passengers were younger, cheerful. We were mixed up with passengers from another company. There were several assistants from the faculty, a couple of professors and the indispensable secretary of the faculty, Mrs. Nada, always ready for a joke and had an infectious piercing laugh. A few older students also went, including Vića, my technician on experimental exercises and assistant in the laboratory, otherwise a lover of electronics and computers. The leader of the trip was the guide Mita, extremely well-read and eloquent, so it was pleasant to listen to him. He explained to us in detail the great program of public works commissioned by the French Emperor

Napoleon III and realized by the Prefect of the Seine, Georges-Eugène Haussmann (*Osman*), between 1853 and 1870, which was the golden age of the development of Paris. These included the demolition of medieval quarters that were overcrowded and unhealthy; the construction of wide avenues, new parks and squares, the annexation of the suburbs around Paris, and the construction of new sewers, fountains and aqueducts. Osman's work was met with fierce opposition, but work on his projects continued until 1927. The street plan and recognizable appearance of the buildings in the center of Paris are largely the result of Osman's renewal of the city.

I learned more about the architecture and history of Paris then than in the entire year of my previous stay. We spent the first day and night on the road in the bus, some were dozing, and some were snoring. We arrived on the outskirts of Paris in the morning. The bus struggled through the narrow winding streets of the suburbs. Turning at intersections was especially difficult. We were all looking out the windows and helping the driver with turns: turn less, turn more, and go back. At one point, Vica's girlfriend gives a joking instruction - narrow passage, now shrug your shoulders. "Put your legs together, that might help more," I added apologetically. Secretary Nada squeals with laughter, in her recognizable piercing voice, so the trip was cheerful.

I took a day to spend with Dick. I took Vica with me. We toured the laboratory, I discussed with Dick a few questions regarding another paper that we need to send for review in an international journal. We had lunch in a restaurant on the Seine. We also discussed my work plans and issues that

would develop in the new laboratory. Dick had helpful suggestions, but agreed that my ideas were interesting. He was aware that I didn't have enough equipment and he prepared a few things to give me, officially as a loan for continued cooperation. In the laboratory, there were three cardboard boxes packed with prepared documentation for customs. The largest box contained a used multi-channel analyzer with accompanying NIM electronics (from Nuclear Instrumentation Module). In the second box was an electronic recorder used for online monitoring of the detection signal change with the voltage change on the electrode that defines the electron energy. In the smallest box were two little-used but no less valuable channel signal multipliers (channeltron). Since there was a good direct connection with the hotel, Vića and I took the gift by metro and left it at the hotel until we left for Belgrade. We didn't have any problems with the equipment at the borders because we had a cover letter with us. This equipment was vital for the planned research, but much was still missing.

After returning to Belgrade, I started concrete work on the preparation of technical documentation and writing a research project for the Ministry of Science for the next project period. Vića graduated in physics and started working with me in the laboratory as a research assistant. He knew technical drawing and began working on documentation for the fabrication of the vacuum chamber and electrode system components for the new experiment, parts that did not exist commercially, but that were original drawings specially designed for the new DUTEM (Double Trochoid Electron Monochromator) system, as called the instrument abbreviated.

In 1980, on May 4, the president of Yugoslavia, Tito, died. It was a sad and "breaking moment" for the whole country. It was a natural event, which had little effect on me personally. I was not politically engaged and I was not a supporter of the so-called dialectical materialism, because in everything that happened I saw neither dialectics nor materialism. The president's funeral was announced for May 8, with the presence of a large number of foreign delegations. We didn't work, so I came out to see that great event with Rile (Ristić), a good friend of myself, he was a generation before me from college. I met Rile occasionally, we lived nearby, it was characteristic of him that he laughed a lot, even without a big reason. On the day of the funeral, we met at the Odeon cinema, on the corner of Narodni Front and Knez Miloševa Street. It was warm weather, heat and a large crowd of people on both sides of the street, the procession moved from the National Assembly to Dedinje. There was a long wait, and there was a large police presence, both in uniform and plainclothes. We were standing on the sidewalk away from the road, we were thirsty, and so we thought about leaving soon. At one point, a few meters in front of us, a tall girl collapsed and fell on the concrete sidewalk. There was a commotion, there were no ambulances nearby. A plainclothes officer tried to lift her up, but he didn't succeed, she was large and had relaxed muscles, so a large policeman in uniform approached. He managed to lift her into his arms. At that moment, the girl's other muscles gave way and she, still unconscious, and began to urinate from a height of over a meter and a half. An unpleasant situation arose, a stream of liquid was leaking out and falling noisily on the concrete in

the form of a waterfall. The policeman took her next to us towards the nearby entrance to the building. Rile started to laugh so infectiously that the people around us also laughed loudly. We ran away from the scene and got lost in the street of Narodni Front. Thus, so our participation ended even before the procession arrived.

That year, in September, the biannual conference SPIG (*Summer School and Symposium of the Physics of Ionized Gases*) was again held in Dubrovnik. I, like all young doctors, was invited to give a lecture in the Progress Reports category about the results published in my PhD. I went a few days before the conference to get a taste of the sea, as I had been prevented the previous summer. I prepared slides drawn on plastic sheets, as was the practice at the time. Before the lecture, I had nervousness; it was my first major public lecture in front of a larger audience and in front of several dozen fellow researchers. The chairman was already mentioned Trajmar from JPL in the USA. Before the lecture, in front of the hotel bar, my colleague Janev from IF encouraged me and invited me for a double whiskey to relax. I refused a double dose, I only took a regular one, and he and two guests from Russia drank a triple, because at that time Russians only drank like that. The lecture went well, it lasted a little longer. To a question from the audience, Trajmar, realizing that I was tired, replied that the allotted time had expired and that this had already been explained in the presentation. During the break after the lecture, prof. Kurepa introduced me to Gordon Dunn from the JILA Institute at the University of Colorado. He was a kind man with a well-groomed thin mustache. We sat down to drink coffee. Gordon

spoke highly of my lecture and was interested in what I intended to do next. He also explained to me word by word what he was doing, that he was planning new research and that there would be a vacant postdoctoral position with him starting next year. He directed me to his plenary lecture scheduled for the next day and invited me to consider possibly coming to Colorado for a year.

I listened carefully to Gordon's lecture and found that the problem was close to what I was planning to do in a certain way. That was not strange to me, because that issue was in the trend of modern research. A trochoid analyzer would also be used in JILA, but the collision target would be ions instead of molecules. My experiment was closer to the researches of Michael Allan from Switzerland, but all three experiments belonged to the complementary group of trochoid instruments. Later at dinner I sat next to Gordon and he introduced me in more detail to the place and working conditions in his group.

The next day, the professional part lasted until noon, and after that excursions or freely organizing activities were planned. In passing, Gordon asked me if I was in the mood to hike with a group of Americans to the lookout point at the top of the Srđ hill above Dubrovnik and return by cable car from the top. I learned later that hiking or jogging were some of the required activities of the academic community in Boulder, where their branch of Colorado State University is headquartered. It was over 30 degrees outside in the shade, and the slope of the hill on the Dubrovnik side was killer. The question caught me by surprise, but even just a cursory glance at the sea and the pool of Hotel Libertas were

inexorable arguments for me to stay there. Instead of sweating in the summer sun and watching the sea from afar, I decided to give myself into these arms, even so to find myself with some of a suntanned beauty. I thanked them for the invitation and wished them to enjoy nature and the view from Srđ. I was convinced that I was not wrong.

A day later, after the regular program, a formal dinner was organized in the hotel for all conference participants. First there was a small cocktail on the terrace. I greeted Gordon and asked him how the trip was, he was delighted. I noticed that all Americans had two festive details that characterized them. One was an ornament around the neck instead of a tie, consisting of a leather cord whose ends passed through a metal detail in the form of a brooch, whether it was a bison's head, a horseshoe, or something similar. Another characteristic of men, from the so-called Midwest, were formal narrow pants with horizontal pockets. I often saw that in cowboy movies. I had dinner with a group of younger colleagues of my generation from the Institute of Physics. At the end of the dinner, the light in the hall was turned off, the music played a march, and the waiters and cooks carried trays with cakes on which small sprinklers were lit throughout the hall, which caused applause in the hall to the rhythm of the march that was being played.

Upon my return to Belgrade, I submitted a new project for the financing of scientific-research work to the tender in the Ministry with a request for approval of funds for the purchase of the necessary capital equipment. I also started collecting the necessary documents for applying for a US visa. At that time, it was not easy to get a visa, various checks and

interviews at the embassy were carried out, and all of that took a long time. Towards the end of the year, I got a visa and planned to leave for America at the beginning of 1981.

I was worried about my father's health, which was deteriorating, he had a malignant tumor. The previous year he had an operation at the II Surgical Clinic and for a while he was quite well. Then the troubles started again. I took him for a check-up, I knew the doctor, but he could not give a prognosis. We talked about it before the trip and I wondered if it was time for me to travel now. He was categorical, you can't help me much, and you have to live your life. We will be in touch. His eyes were full of tears, mine too, but we didn't let a single one go.

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I traveled on a PanAm plane first for 6 hours from Frankfurt am Main to New York, where I lost my connection, so they transferred me to the next flight by "Delta" to Denver, another 3 hours. They waited for me at night at the airport and took me to the reserved apartment for the night. I woke up in the subrub of Table Mesa, on the edge of town where the Rocky Mountains began to the west. They say that Boulder, a small beautiful town at an altitude of 1650 m above sea level, was the last place that the settlers reached by wagons and carriages, and from there you could only ride, horses or mules. It is located about twenty miles north of Denver. There passes the dividing line of the plains to the east and the largest mountain range of the Rocky Mountains in North America towards the Pacific. By the way, about 70 miles south of Denver is Colorado Springs, with the once prestigious research laboratory of Nikola Tesla.

Boulder is the home to the University of Colorado's natural sciences campus, and several major centers of national importance, such as NCAR (Center for Meteorology), LASP (for Atmosphere and Astrophysics), NBS/NIST (for Standards and Technology), JILA (for laboratory astrophysics and precise measurements) and about 70 others. Boulder itself is located in the geographic center of the USA

at the crossroads of all parts of the country, so it represented a stop on the paths of all scientists with an incredible frequency of the most important seminars and lectures.

JILA is located in downtown Boulder, with a dominant 10 floors tower and a long strip of laboratories two floors above and two levels below ground level. The most sensitive tests and measurements were carried out in the basement levels, for which maximum stable physical conditions were necessary.

On my first day, secretary Cheryl Glenn put me in the car and gave me a tour of the campus. She showed me where the libraries, restaurants, administration, banks, sports fields and all the basic things I might need, are. Gordon showed me the labs; he had two projects, one with electron ion beams collisions and the other with the so-called ion trap with superconducting magnets. I was slated to work on this first one. Aaron Falk, who had just finished his doctorate, and two students were in the laboratory at the time. I continued working on Falk's experiment, so I tried to get to know the parts and procedures for measurements as much as possible, I wrote everything down and asked for explanations. Soon I was able to work independently. In the first month, I also had a two-week drill in a mechanical workshop. It was explained to me that I will not have anything to do there, but that I should learn what is possible to make and what is not, not to ask the master for something that is impossible. It made sense.

I started working first on interactions with singly charged metal ions, which were interesting for materials on modern

spacecraft, and also for maintaining KTF (controlled thermonuclear fusion) plasmas. We also had a developed collaboration with the NBS/NIST group in Oak Ridge, Tennessee, where Gordon's former PhD students were working on multiply charged ions of the same metals. It was amazing to me that I carried a photomultiplier on the plane to Tennessee, as a loan, because we had it in the laboratory and there was no need to buy another one for the measurements there, although it was not an expensive device. An important lesson: nothing was wasted.

By the way, my lab was spacious. It had one large apparatus made of stainless, non-magnetic steel, with three attached vacuum chambers evacuated by three high-speed, high-capacity diffusion pumps and three noiseless ion pumps for ultra-high vacuum. Around on three sides there were seven racks with instruments that supplied the experiment with current and voltage, enabled operation control, detection and processing of signals, and a control computer unit for processing the results.

Simultaneously with the measurements, Gordon and I worked on designing a new trochoid analyzer. Gordon was a Mormon, originally from Salt Lake City, Utah. He was extremely tolerant. As far as I knew, the Mormons, like the Amish, were a distinct religious and cultural group, dedicated to a natural, traditional life. They protected family values and were against contraception. Gordon had 11 children, ten sons and one daughter. Occasionally, for his birthday, they had reunions where most of the family was present, so I also had the opportunity to see and meet some of them.

Two other students worked in the laboratory. Carl Timmer was blond, tall, the son of a Protestant pastor and working on a Ph.D. Eric Wahlin was the son of Lars Wahlin, a native of Sweden who owned Colutron CO. in Boulder for the design and manufacture of ion sources and ion optics.

The main team for machine language programming and the creation of the interface with the experiment were of Japanese origin, eng. Cheng and Vicky. Every day at noon, they would pull out the tennis table and hit the ping-pong ball frantically for exactly half an hour.

For lunch, we had a well-stocked Alfred Packer cafeteria in the center of campus with hamburgers, cheeseburgers, fish and chips and various other delicacies. It was named after Packer (*https://www.wikiwand.com/en/Alferd_Packer*), who was a guide, and was accused of once being forced to be a "human cannibal" when he was lost in the wilderness (during the winter of 1874.). Be that as it may, the students named the place after him. For dinner, Pizza Hut was available with a huge TV screen where we relaxed a bit with the Star Trek series.

After lunch, students would sit on the lawns and benches in smaller or larger groups and lazily recount the day's events while enjoying the digestion of food and the occasional treat or fresh fruit. Communication among students was easily established and spread easily and smoothly. Unlike campuses in European cities, where it is not usual to start a conversation without getting to know each other, here it was more direct and simple, and there was no foiling. One incident remained deeply etched in my memory. We were

sitting on the lawns, and a guy on a bicycle was passing by on the concrete path between us. He rode slowly, the track was flat and smooth, and at one point the guy rolled over his bike and stretched out as far as he was on the track. Those closest to him jumped to help him or at least asked how he was, if he was hurt. He shook his head a little and said: I feel ashamed because I fell for no reason, the path is flat and there was nothing to fall for. I'm just ashamed and feel stupid; otherwise I don't feel any pain. Starting from myself, and most of the young people I know, they would try to find at least some minor reason, at least the shadow of a tree or a puddle of water from an overturned bottle, but the first reaction would not be personalizing their own guilt. It is a subtle but vital difference between the American mentality and ours, and in general I had the impression that people there are more direct and open. At first, I was surprised how often and with a sincere smile people on the street greet and say hello, even though they don't know each other. I liked that. Until I got used to it, I would turn around and try to remember where we knew each other. And we didn't know each other.

There were sports fields scattered all over the campus, from tennis, baseball, rugby, football. The local rugby team was "Buffalo", with a live mascot, majorettes and cheerleading squad. Their stadium was located right next to the Institute. It was exciting and cheerful and the first time I was at a game I expected pleasant moments. I went down to the field itself and sat in the first row. When the game started, the ball landed on the field near me. Another attack started right in front of me. At the sound of the whistle, there was such a

break and collision between the two teams in front of me, so that pieces of equipment and protective helmets flew in all directions. As soon as it calmed down a bit I got up and went to the top of the stadium, away from these tough guys.

It was much more pleasant in the stadium when pop rock concerts were held. One of the top ones was held by the Rolling Stones. The stadium was full; Mick Jagger was floating on a crane on a telescopic stand high above the middle of the stadium. The sound system was phenomenal. Most of the concerts were held in the Red Rocks Arena in the natural setting of monolithic red rocks. The Who, Toto, Bruce Springsteen and many others were guests there, especially in the summer season. The most intense party life on campus took place at several bars on Friday afternoons and late Saturday nights, including Hilton Harvest House Inn, Dark Horse, Coal Company, What's Up, Broker Inn, Boulder Club, etc.

The first car I bought was an old, big American Plymouth. It was cheap, and the price of fuel at that time was also favorable, a gallon was under one dollar. Driving training was not necessary and the license was obtained in half an hour along with practical driving. Registration did not exist, but responsibility for damage was precisely defined. Easy driving is enforced. In two years, I changed three cars, so I also started reselling among acquaintances. When my colleague Janev from the Institute of Physics in Zemun came to Boulder, he asked me to buy him a car. But he had a special wish; he wanted me to find him a Cadillac. I found him a nice preserved car, a golden yellow convertible. It was huge, automatic, price 1000 dollars. I offered him one for half

that price, but he didn't want it. "I'm buying a Cadillac once in my life and I want it to be in excellent condition." We took possession of the car and I took it for a test drive. I explained to him how the automatic transmission and brakes work. When he sat down to drive, he felt the great mass of the machine and he braked suddenly, so that he hit his head on the windshield. However, he quickly learned his lesson. I sold that car when he was returning home. I paid him $1000 and I drove it for a few more months, really enjoyed it and sold it for $1500.

Campus life was well organized. Everything that was not forbidden was allowed. The breath of freedom and youth could be felt everywhere. Various organizations functioned to help students and employees, to protect various rights, legal aid and the like.

I received letters from my brother about news in the family. The father's state of health was variable. My brother sent me the name of a promising new drug manufactured in the USA. I got the medicine, but the problem was sending it to Belgrade. At that time, there was no special express mail, and there was also a problem with customs regulations when importing. However, I found an agency that dealt with it, with a representative office at the Denver airport. I packed the medicine and took it to that agency. I also bought a nice wrist watch, with a metal case, silver color with the same strap bracelet and put it in the package. It was a return gift for the first watch my father bought me when I graduated from primary school, he will definitely understand that. They wrote to me that he did not take it off his hand.

In June, Gordon and I were again at Oak Ridge (ORNL-Oak Ridge National Laboratory) in Tennessee, in the group of Dave Crandall and Ron Phaneuf. It was a lab similar to ours in Boulder, with an experiment of crossed ion-electron collisions, but with about an order of magnitude more performance in terms of the degree of charge of the ions and the available energy of the ions and electrons. We performed the ionization and excitation of oxygen ions with charges +5 and +6. The measurements were performed for the first time, so we were surprised by new processes from resonances and on electrons from the inner shells that we detected. Each new process was a special challenge because it had to be proven and explained.

I remember some details when narrow resonance structures were obtained in the vicinity of the excitation threshold, which was worked on for days in order to obtain a reliable statistical confirmation. Through persistent measurements, some of those structures were "ironed out", while some changed to permanent forms and remained. I used to marvel at Gordon's insistence that measurements be made until reliability of one standard deviation is achieved. He was the oldest of us and he knew that little statistics can be deceiving. Once he explained his views, it was a big role. Serious researchers build trust and reputation over years, even decades. And, he said, it is enough to make one mistake and everything will collapse. I often recalled these words of his. It seems to me that this is the key to the success of science and society in general. This is especially characteristic of the USA. Of course, there are contrary examples everywhere, but

if there are good foundations and principles, anomalies are easily corrected.

Meanwhile, we were at a big international conference in Gatlinburg, Tennessee, where there was a lot of discussion about the so-called to the DR process (two-electron recombination process) and the possibility of detecting its products. The importance of this process lay in its possible application in nuclear fusion plasma in a tokamak due to its influence on the charge balance of particles as well as on the overall energy balance. Due to the configuration of the experiment we had in the laboratory to measure the excitation of singly charged ions, not many changes had to be made to attempt the detection of neutrals from the DR process. We agreed to take a break in which we would change the target and try to detect DR electrons on Mg+ ions. Said, done. I inserted a strip of magnesium into the ion source and within a few days I was producing a steady stream of Mg+ ions. There were also some theoretical calculations that indicated that this process becomes very significant, especially in the presence of external electric and magnetic fields.

What does the DR process consist of? If an electron collides with a singly ionized particle, at energy lower than that required to excite the ion, the electron and ion are attracted by the Coulomb potential and the probability of ion excitation increases. If a bound valence electron is excited, for example, from the 3s to the 3p level, the incident electron loses all energy to the excitation and remains captured in a highly excited Rydberg state. So, we have formed a neutral atom with two excited electrons - hence the name "two-electron recombination". This atom can be de-excited via the 3p-3s

transition, so that one photon and one neutral atom in the highly excited Rydberg *nl* state are obtained in the output channel:

$$Mg^{+}(3s)+e \rightarrow Mg(3p,nl) \rightarrow Mg(3s\ ,nl)+h\nu$$

The proof that this process was realized is the coincident - simultaneous detection of photons and neutrals, which originate from the same event. Photon detection is performed using a photomultiplier and we have already done this on this same apparatus in Boulder, measuring cross sections for the excitation of Mg+ ions. For the coincident technique, the laboratory had detectors, electronics for pulse amplification and a TAC (time-to-amplitude converter) with a computer interface. The main problem is expected in connection with the detection of neutral Mg atoms. We had no experience with neutral particle jets, and we assumed that there would be difficulties with directing, focusing and determining the efficiency of their detection. To begin with, the energy of the primary ions was increased by raising the source voltage to 10 kV.

Regarding neutral detectors, Gordon and I participated in the Advanced Research Electronics Show held in Denver, where some of the solutions from various programs related to space research and the development of detectors for unclassified military equipment were on display. As expected, the most interest was attracted by the so-called multichannel plates, as the basis for CCD cameras, which at that time were intensively developed and applied, mostly as 2D detectors with high spatial resolution. According to the presented specifications, Gordon chose a system for which good

characteristics for the detection of both ions and neutrals were specified. It was a circular plate with a double chevron configuration, 1 inch in diameter that could be mounted in a steel tube with a supporting CFF-35 flange in our experiment.

In order to mount the new detector, the experiment had to be opened to the atmosphere, and then pumped again and according to the procedure to be "baked" continuously overnight using UV lamps and aluminum foil as a reflector, at a temperature of 350 Fahrenheit. The experiment was brought into working condition and we started the measurement. Everything worked more or less, but only a relatively flat noise was obtained on the detector of neutral atoms, which did not depend on other parameters, neither on the current of electrons nor on the current of ions. Basically, every new experiment starts like that. We soon realized that the problem was due to the absence of the neutral beam control. The primary ion beam can be nicely controlled by elements for the so-called ion optics: electrostatic deflectors, magnetic field deflectors, *einzel* lenses for transport and electrostatic lenses for beam focusing. However, none of the above works on neutral particles! Of course, we knew that before and we had to find a way to bring the neutrals to the new detector.

An additional complication, regarding the neutrals, was the presence of a weak magnetic field in the collision volume which was formed by the four permanent magnet rods; it was directed normal to the ion beam and served to collimate and guide the electron beam. This magnetic field bent the trajectories of ions outside the bars downwards, and inside the bars upwards. The vertical profiles of both beams were

measured with the help of a slat on a stepper motor, thus determining the so-called beam overlap form-factor to calculate the geometric factor of the measured effective cross-section. The ion beam profile contained the distribution of ions and thus neutrals in the collision volume. The ion beam was further guided into the electrostatic analyzer, and the neutral beam moved along the path and speed it acquired in the collision volume. That trajectory could be influenced by pre-collision elements. By analyzing the ion trajectories, I was able to conclude that it is necessary to translate the neutral beam vertically in order to fall on the new neutral detector. In this way, we managed to increase the signal of the detected neutrals, but we had no idea about their focus and the fraction we detected. We decided to investigate the focusing of the neutral on the detector by mounting a phosphorescent screen in its position. Then we would remove the screen and install a multi-channel plate for neutral detection and cross section measurements.

I made a draft of a phosphorescent screen support for neutral monitoring that was to be made in the workshop. During that time, I decided to go on vacation to California with my friend Bernard Stump, who was a postdoc from Germany and worked in the neighboring lab with Alan Gallagher. We left in the first week of July. Bernard offered to go in his car, but when we wanted to pack our tents and camping equipment before the trip, we decided that his sports two-seater was too small, so we decided on my purple MGB GT hatchback, it had 4 seats. We headed south and southwest, through New Mexico and Arizona toward the Grand Canyon. Immediately after leaving Boulder, the picturesque slopes of the Rocky

Mountains and fantastic landscapes like those from cowboy movies, which we watched to exhaustion in our youth, appeared, the real Wild West. I was driving. We went without a precise plan and without special timing. We didn't have a phone or any navigation, we stopped at rest areas with beautiful scenery, and Bernard had a geographical map that served us for orientation and control where we were. The roads were well marked with frequent signposts. We saw by the name of the towns when we left Colorado and crossed into New Mexico. We arrived in Albuquerque in the early afternoon, and decided to have lunch there. We chose a decent restaurant that advertised traditional Mexican food, which was often served in the southern US, since it had a large Mexican population. It was hot and we liked the chilled atmosphere of the salon, from the classic fans that were lazily spinning on the ceiling and from the fine water sprinklers, as well as from the arranged greenery with sparse flowers, and we were also very hungry. We chose the food, a little based on the name, and a little based on the pictures in the menu. There was a note that the food was spicy, but that's the nature of all Mexican food, they really eat spicy.

When the food arrived, I started to eat suddenly, but quickly stopped. It was very spicy, and I don't usually like spicy. I started blowing air on my mouth and tears came from my eyes. I stopped eating for a few moments, but then, when the spiciness subsided, I began to feel the real taste of the food, which I liked. I took more food from the other part of the plate and it was even more delicious. I ate slowly, between bites I blew because of the spiciness and occasionally wiped my tears with a napkin. However, hunger prevailed, I got

used to the spiciness, and the taste was more and more pleasant to me. I ate slowly and cried, but I enjoyed it at the same time. I almost never ate something so delicious.

We rested for about an hour in the shade and decided that we could cover another part of the road by evening. We decided to cross into Arizona and headed for Kayenta, a small place on the way to the Grand Canyon, so as far as we could go. When we reached that place, we were surprised. It had a one-story wooden hotel, a car repair shop, a gas station, a general store, and a few scattered wooden apartment buildings. Of course, the hotel was busy, and we didn't have a reservation. The next place was over 100 miles away, and we didn't have any reservations there either. We decided to camp a few miles from Kayenta in the desert on the left, but not very near the road. We found an empty area, without cacti and bushes, there we pitched our tent under the glow of the moon and transferred our sleeping bags. Tired from the trip, it seems we fell asleep very quickly. Sometime after midnight, I was awakened by the barking and howling of a coyote I assume. Bernard also woke up. We didn't want to get into the car. We took flashlights and a jack lever from the car and felt more secure. The coyote's howl weakened and was lost.

We washed ourselves with water from the canister, made coffee on gas and headed towards the Grand Canyon. We arrived about noon near the Canyon, on the west bank of the Colorado River. The terrain was flat; it was still unclear what was in front of us. We found a campsite, got a place for a tent and went on our first tour.

It wasn't until we approached the lookout point that the magnificent view appeared below us. The Colorado River Canyon is a natural geological formation, characterized by layered bands of red rock, the most varied shades due to impurities, revealing millions of years of geological history in cross-section. The canyon averages 10 miles wide (6 to 29 km) and a mile deep, for a total length of about 277 miles (450 km). Most of the area is a national park. Geological structures, color and size are so impressive that they take your breath away in the first moments. Due to the great depth and arrangement of steep sediments, the river can only be seen from the upper surface in places, as a distant, cloudy, ochre, winding strip. In some places, there were mostly natural, unsecured paths that could be used to descend to lower levels. In some parts, movement was very difficult. There was also a special service in the form of a convoy of several mules on which some visitors rode. It was an easier way of moving, the speed was the same as walking, but the stench and dung of the sweaty mules made it almost unbearable to go beyond the first rest stop.

The biggest impression on me was not the impressive size and appearance of the canyon itself - but the time it took for the small river below to wash and carry all that material to the Gulf of Mexico on the Pacific Ocean. That time scale was unimaginable to me, I often came back to the question, how many 5-6 million years is that. By the end of the day we were walking along the edges of the western side. The next day we planned to go down an easier trail to a rest area where we estimated we could get back to camp before nightfall. It was

exciting and very tiring. Some went near the bottom of the canyon, almost to the water.

From the Canyon, we headed to Las Vegas, via the Hualapai Indian Reservation. On the way, we stopped to look at the Indian handicrafts that they were selling. That part of the road to Vegas is a desert, no settlements, no vegetation, just sand and the occasional cactus all around. At one point, it became cloudy on the left side of the road. We noticed in the distance a large tornado leech, which was still very far away, but it was moving towards the road quickly, we could also feel a strong wind from that side. I slowed the car down because I wasn't sure what to do, whether to stop, turn around or keep going. The leech was getting bigger and was threatening to cross the highway about where we were. There was no one on the road with the car, nor in the surrounding area. Suddenly, I saw a car in the rearview mirror that was approaching us at high speed. They were driven by a woman herself and it was as if she was racing the hurricane to avoid it. It had California plates, I instinctively hit the gas. If she's from around here or going to California, she must have had some experience with intercepting and avoiding encounters with hurricane leech. I was driving at the speed of those cars in front of us; the sand plume was turning in the opposite direction. I noticed that after a few minutes she cut the highway behind us about where I thought I would stop. I breathed a sigh of relief; the experience of the unknown woman helped us to avoid the possible consequences of this sudden encounter with adversity.

We arrived in Las Vegas in the afternoon. I made several rounds to look around the city. Luxury casinos in high-rise

buildings were concentrated in the very center. I pulled into the parking lot of a mid-rise hotel with a large illuminated sign of a cowboy waving his hat as if inviting us to stop by. I recognized that commercial from the TV at the Pizza Hut in Boulder. The accommodation was cheap, the restaurant too, everything was subordinated to attract you to stay there and try your gambling luck. We rested a bit, had dinner and then went out to the roulette parlor to see how luck would serve us. I'm joking; of course, I knew what our chances were, so I just took a petty cash to feel the atmosphere. I quickly lost it. Bernard was luckier, he turned a few laps, he won something, but in the end he also lost the planned quota. Then we wandered around a bit, there was also entertainment, they had additional entertainment programs for visitors of different ages. Jack Pot machines were everywhere. Everything was colorful, like at a big fair and most of the visitors enjoyed themselves.

In the morning we continued towards Los Angeles. At the entrance to the city, the highways flowed into eight-lane streets in one direction with metal plates, bumps that gave a warning when you changed lanes. Rivers of cars flowed into the city. On the very approach to the city, from the surrounding hills, a huge city could be seen lazily descending in a kilometer-wide basin towards the Pacific. When you are still at a height, above the city you can see a plane up to which the space is filled with smog. That level and color of the air changes with time and meteorological conditions and I was shocked because I was so obviously confronted with incredible urban pollution for the first time.

We stopped at a roadside parking lot and sat down at a McDonalds to refresh ourselves. I took out my notebook and flipped through the phone book under LA. I found the number of a girl I met at the Dark Horse Bar in Boulder a month ago. She was from LA, at a geology seminar, an interesting and cheerful person. We hung out for a couple of days and she invited me to drop by after I mentioned that I was planning a trip. I called her from the phone, she told me the address and within an hour I rang the bell. She lived in a big house and we stayed in one of the rooms. We were too tired to go out, so we freshened up and soon the pizza arrived, which she ordered. She had to go to San Diego in the morning, so she showed us the codes on the front door.

The next day we moved to Venice near Santa Monica on the Pacific coast, to a married couple of Bernard's friends who were studying there. We were three blocks from the Venice Skate Park, right on the oceanfront. The coast was decently landscaped, with a promenade, parks, palm trees, volleyball and tennis courts. The beaches were huge, with white sand, but hardly anyone bathed. The ocean is not suitable for swimming, the waves are constantly rolling and the water is cold and full of sand.

There were many people on the promenade, mostly young people, students and tourists. Some rode bicycles or skateboards, some played volleyball, and the largest number threw Frisbees, whose popularity at that time was at its peak. Frisbees were played in groups making incredibly practiced throws, bordering on the impossible. It could be seen from the communication that those in the groups know each other. They addressed each other and communicated. In the groups

there were mostly dark-skinned guys, among whom a big guy, athletically built and striking, who controlled the situation, would be dominant. Strikingly dressed girls generally walked around and among them, regardless of skin color. When Bernard and I sat down on a bench to rest, we noticed a young girl crying claiming that someone had stolen her wallet on the boardwalk. She approached the "leader" of the nearest group and explained what happened. He turned to the nearest teammate and said something to him. I was curious to see what would burn. The girl calmed down, and the teammate returned after 2-3 minutes following a small black boy. The "leader" told him to return the wallet. He reluctantly put his hand in his pocket, took out her wallet and gave it to the girl. He received a sharp slap from the leader that made him stagger. Justice was served quickly, no one got excited, not even two uniformed law enforcement officers who were passing by, and they certainly saw what it was about. Some rules seemed to exist here on the beach as well, some tacitly accepted order reigned.

The next day, Bernard went to Hollywood by public transport, as a tourist, and I had an arranged visit with colleagues S. Trajmar and A. Chutijan at JPL (Jet Propulsion Laboratory), which was part of Caltech (California Institute of Technology), i.e. NASA. I met Trajmar at a conference in Dubrovnik, and Chutjan in Gatlinburg. I spent a few hours in their laboratory, which was one of the first and leading in the field of atomic collision processes and whose publications were indispensable literature for students and doctoral students all over the world. We also discussed the ongoing two-electron recombination experiment, which was started in

Boulder. They confirmed as founded our planned diagnostic methods with a fluorescent screen and a multichannel plate for detecting neutrals.

The next day we continued our journey to San Francisco. We went along the coast from Los Angeles on the famous highway "Highway No. 1" in America. The distance of about 380 miles (610 km), said to be one of the most beautiful in the world, was truly captivating and seemed unreal. The coast was essentially inaccessible for the most part, but the scenery was phenomenal, with countless vantage points. For Frisco, as it is popularly known, I had another wildcard in the phone book. She was a lovely masseuse, who practiced yoga, whom I met at the Broker Inn in Boulder. She lived with three other girls in a secluded house with a wonderful view of the entrance to the Gulf and the Golden Gate Bridge. Below us lay hills with trams, steep streets and China Town. In the evening, all six of us went to a reggae music concert at a locally famous restaurant, a common meeting place for the nostalgic pro-hippie population. We dined and then danced, in our own favorite styles. We were in no hurry; it was the beginning of the weekend. Bernard and I planned to visit several interesting places that they advised us. Among other things, these were the Golden Gate, but also the Alcatraz island prison, which was near it. The Golden Gate was imposing, magnificent, it was a special experience to cross it and on the way back to see Frisco, who was resting on that less busy Saturday day. On Sunday, we went to the beach, to gather air and solar energy for the further journey. There were nice beaches in the Gulf, and they were quite separated from the ocean, with less sand and much smaller waves.

We headed back along the northern corridor, through Nevada, Utah and Wyoming. Our first stop was in Reno, Nevada. It was a small town, famous for the fact that it, like Las Vegas, allowed gambling. It was little known, but we took advantage of cheaper hotel accommodation, like in Vegas, and spent the night there. A long journey awaited us again across the Nevada desert and across Utah. On a couple of hours of driving through Utah, we had a special, unexpected "salty" experience. On the left side of Highway 80, we noticed a thin white blanket. It was July, but it looked like real snow. But then again, America is big; we didn't know how far north we went. I haven't heard anything about it, and I haven't thought enough about what it could be. I had to stop, Bernard got out, grabbed some powder and brought it to his mouth and then spat it out. Salt, he called out. That's how it was, and we saw road signs along the way, so many kilometers to Salt Lake City, and the city is on a salt lake. If I hadn't seen it, I wouldn't have imagined that there was so much salt, still far from both the lake and the city. I slowed down and tried to leave the area, god it took a while. According to the timing, we did not plan to stop in that city. We soon entered Wyoming, the mountains appeared, and we endeavored to speed our way to Colorado and to Boulder. On the way we passed Cheyenne, a place near the Colorado border. We had planned to go there before, with Gordon in August for a big real cowboy rodeo.

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The phosphorescent screen holder was finished in the workshop. This was followed by some more checks and the

opening of the detector tube to mount the holder, together with the screen. Then followed the closure and again the high vacuum pumping procedure. Gordon told me that in the meantime, one good thing and one bad thing happened, on the same occasion. Dave Crandall from ORNL in Tennessee has been officially invited to work for the NSF (National Science Foundation) in Washington. The good news is that he was invited, because it is a great recognition, and he was really a hardworking and very successful researcher, who knows what to do and how to do it. NSF is a government body, like our Ministry of Science, but it is led by proven experts and the best scientists, not politicians. It is the American way of choosing and deciding. The bad news is that science is losing a capable operational researcher, and we as a group are losing an invaluable collaborator. In this case, Gordon argues, and I agree, the good news outweighs the bad news. Or to translate it into Serbian, for this kind of connotation with a negative outcome, the old proverb says "the harm ate the benefit", and we don't have a saying with a positive meaning at all. These kinds of things are resolved among honest and professional people simply and without competition; when you know who is who, who mows and who carries water.

I remember another example from the beginning of my stay here. One professionally moderately successful guy passed his master's thesis in the group and his employment was discussed. Gordon participated in that decision and says that they did not accept him into the group, but sent him to a company where he received a higher salary and was more

satisfied than if he had stayed here at the Institute of Science. So to speak - both the wolf and the sheep are outnumbered.

The fluorescent neutral detector soon worked. It was first tested with an ion beam detected without deflection. The signal was also visible to the naked eye, like the flickering of a phosphorescent screen, especially when the room darkened. I carefully changed and recorded all the ion beam transport parameters. Then the ions were deflected after the collision volume with an electrostatic deflector at 45 degrees. The rest are only neutral, which fields do not affect. No signal received again. A noise was obtained that almost did not change. It was like that for several days. I could see that Gordon was beginning to lose hope. In a conversation with Leinberger, head of the neighboring photon laboratory, he expressed doubts about the success of the new DR experiment. He hoped that it would still be possible to try statistical processing of the detected noise, so if that doesn't give results either, let's give up. I was still convinced that it would work. I had that feeling because I now knew well how the device worked. I said that I do not believe in statistics and that the signal must be clearly seen. I asked for three more days and promised good results.

In those days I was persistent, I analyzed everything that had been done and again came to the conclusion that the incident beam must be translated by about 4 mm vertically upwards because the trajectories of ions and neutrals differ from the collision volume onwards. I used a stepper motor with a narrow slot to "raise" the incident ions, and it worked. I adjusted the coincident signal over a wide time interval and managed one night to obtain a spectrum that showed a clear

peak located at five adjacent points. I then narrowed the time interval, started a new measurement and in two hours got a DR cross section. I was very excited. After midnight I went to the apartment determined to repeat the measurement the next day.

The morning I came to the lab I found Gordon and Tom Morgan, who had come from Massachusetts for two weeks. They had already seen last night's spectrum and Gordon was beaming. I said that I would repeat the measurement again; I adjusted the apparatus, further narrowed the coincident time interval, started the measurement and said that we would see each other in two hours. I went outside and lay down on the freshly cut grass in front of JILA, it was sunny. Tom came and sat next to me. We waited for 2 hours, like spinning a roulette wheel, two long hours. The result was impressive. We received an unmistakable signal of the DR process. Gordon recorded the resulting spectrum, wrote the reaction formula on it and added FIRST EVER in large letters! He hung a poster on the notice board of the institute. Word got out, colleagues from neighboring laboratories started coming to congratulate. Gordon sent a student, Eric, to print a poster in 5 copies on the front of the T-shirts, and to put the names of the five of us on the back. The next day, on Friday afternoon, a cocktail party was organized with sandwiches and drinks (non-alcoholic, of course). The younger group ended the party in the evening at the bar of the nearby Holiday Inn.

I photocopied Gordon's poster and sent it to prof. Kurepa to Belgrade. I was informed that the poster was published on the

Teaching Council and also posted on the notice board of the faculty.

Twice we had conference discussions with different groups of theorists via speakerphone. The measurements were just at the beginning. Everything had to be checked and calibrated. First comparisons showed that our measurements gave significantly larger effective cross sections, almost an order of magnitude larger than theoretical calculations predicted. Theorists Hahn and Lagatuta sought an explanation together with us as to why this is so.

It was logical to assume that the discrepancy could be a consequence of the presence of an electric or magnetic field in the collision volume of the experiment. As already stated, the electron beam is indeed collimated in the collision volume by a weak magnetic field directed normal to the ion beam. That field, together with the velocity of the ions, acted on the ions with the Lorentz force, i.e. the effective electric field of strength $\boldsymbol{v}$x$\boldsymbol{B}$ directed vertically, normal to both beams. Therefore, there were conditions for the emergence of the Stark effect[1]. The consequence of the Stark effect in atomic physics is the splitting and expansion of atomic levels, which causes mixing of states and increases the probability of interaction between particles, i.e. increases the effective

[1] *The Stark effect is the shifting and splitting of spectral lines of atoms and molecules due to the presence of an external electric field. It is the electric-field analogue of the Zeeman effect, where a spectral line is split into several components due to the presence of the magnetic field.* Wikipedia.

cross-sections for specific atomic processes to occur. Hahn and Lagatuta included this effect in their calculations and obtained cross sections that were in good agreement with our experimental results.

A series of measurements of effective cross sections for DR as a function of electron energy, in the area below the threshold for the excitation of the 3s-3p transition, up to 10 eV, was performed. A good agreement with the theoretical results was achieved. This was followed by the painstaking writing of a paper for publication in the prestigious journal Physical Review Letters. Every detail had to be checked. Gordon was very careful about it. He was a passionate hunter, but he almost missed the hunting season at the beginning of autumn. The paper was finally submitted and was soon accepted for publication. This time there was an even bigger celebration, there was also champagne, which was a special curiosity at JILA. The date 9//29/82, when the bottle was opened, was inscribed on the cork stopper of the bottle and I kept it as a souvenir.

The described measurements also opened up new questions, such as the influence of external and local fields on the cross sections for two-electron recombination in thermonuclear fusion plasma. And that is important from a practical experimental aspect, which will be discussed later.

The summer was coming to an end, and thus the end of the current school year at the University of Belgrade was approaching. I had a leave of absence from the faculty until the end of the school year, but the research in the USA was successful and a very interesting continuation of the work

should follow in the next few months. I turned to the Teaching Council with a request to extend the leave, which was the practice in some previous similar cases. Whether due to some interest or human rivalry, the dean and the administrative board took the position that I should not be granted an extension of my stay in the USA, and this was also adopted by the teaching council of the faculty. I received a short answer that the application was not approved and that I should return to the university in early October.

I was disappointed, but I decided to travel to Belgrade, for two reasons. One is that I haven't been in the country for a long time, and the other is that I was hoping that way I could try to get a leave after all. I also thought about terminating my employment at the university, but I had no alternative for a job, yet. In addition, I wanted to move to a European country, perhaps Germany or Belgium, to continue my research because that attracted and fulfilled me the most.

I was in Belgrade at the end of September. On the ninth of October, my first daughter, Rajna, was born, a sweet joyful girl. She was named after her maternal grandmother. In October, I was already at the university lobbying for an extension of my leave. I got permission to leave; people behave differently when a person is present.

When I returned to Boulder, everything was as before. A new visiting fellow, Alfred Müller, from the University of Giessen in Germany, has also been added to the group. He was a very experienced researcher and good to work with. We continued our work on two-electron recombination on magnesium ions, namely on experimental measurements of the influence of the

field on the effective cross-sections for two-electron recombination and the distributions of occupancy of the Rydberg states of neutral atoms.

Alfred proposed that field ionization of Rydberg atoms from the collision volume be used for this, by introducing a gradient electric field in the path of neutrals. Two vertical plates were placed at an angle of 30 degrees to each other and were oppositely charged. The wider end of that angle tapered away from the collision volume, amplifying the electric field. On one plate, at the height of the neutral beam, an opening was made on which a PSD (Position Sensitive Detector) device with a multi-channel plate and a fast detection technique was placed, which could detect the location of a particle falling on the plate. By changing the charge polarity, either ionized electrons or ions formed from neutrals could be detected. Therefore, the field grew from the collision volume, first particles from higher, then from lower Rydberg states were detected in the interval of the main quantum state n from 15 to 60, with a maximum at about n_f=35. The field in the collision volume itself could be changed indirectly, through the Lorentz force, by changing the speed of the ion beam.

This was a very complex experiment, fully computerized and provided a wealth of useful data that successfully and completely described the mechanism of cross section change for two-electron recombination as a function of the external field in the collision volume. Despite all the conveniences, the measurements took several months. This was followed by a new processing of the results, writing of the article and

exchange of comments and arguments with the referees of the journal until publication, again in Physical Review Letters.

In parallel with these activities, Gordon and I worked on the development of a new experiment, the already mentioned trochoid analyzer for electron-ion collisions of atomic particles with so-called merged beams. The existing experiment in the laboratory was a classic example with crossed beams, at an angle of 90 degrees. Merged beams are obtained when two beams move along the same trajectory on a part of the space and enable work with much lower collision energies, which is important both for cross section measurement for excitation processes and for all resonant and indirect processes. Similar equipment is used in both types, but it was decided to make a completely new experiment, with more modern, technologically advanced equipment, including two sets of PSD detectors for forward and backward angle scattered particles, as well as modern superconducting materials for magnetic fields. It turned out that this new device would be very expensive and require more room, so the possibility of the construction and preparation being done at JILI, and that it could be transferred and used at the large ion source at the ORNL laboratory in Tennessee, was also considered. There were also personnel issues due to the departure of Dave Crandall from Tennessee to NSF in Washington and the transfer of Ron Phaneuf to the University of Reno.

Christmas was approaching, winter had arrived. Along with the New Year came one week of rest in the skiing season, in the mecca for winter sports. The Denver area has several famous centers with picturesque landscapes, groomed ski

slopes and a variety of entertainment programs. In the first row there are Aspen and Vail, at an altitude of about 2500 m, the first about 300 km and the second only 160 km from Denver. Aspen is a more fashionable place, and Vail is for a wide range of guests, including resorts with agency "sharing" type apartments. This is an interesting option where those interested can buy a share in the ownership of an apartment that is available to them during the year, for two weeks in winter and two weeks in summer according to a fixed schedule, a total of 4 weeks. The rest of the time it is used by other co-owners according to the same schedule, and it can also be rented out. Laura Norton, Tom Morgan's student, was also in the lab at that time. She was doing her thesis, writing about Einstein's discoveries, using copies of the author's original works from the university library. Her cousin had his shear in one of the agency suites and was suddenly prevented from using it. They had no other choice, so she invited me to spend a week skiing in Vail. I had no ski gear, but I borrowed from Al Gallagher, who was almost my height, but more importantly wore size 12.5 (46) boots, like me. Vail Ski Resort is the largest ski resort in Colorado, founded in the sixth decade of the last century, with a population of about 4,000 inhabitants, with a picturesque stream in the middle, an abundance of evergreen trees and flowers, with the highest botanical gardens in the world, with carefully integrated architecture of cottages and hotels, cafes and bars, cultural facilities, developed cuisine with the most diverse restaurants. In a word, an extremely pleasant place, with outstanding ski slopes, lifts and service that one could only wish for.

Later that spring, instead of attending the conference in San Diego, I traveled to the East Coast, Massachusetts and Connecticut, to visit Tom Morgan's lab at Wesleyan University, where I gave a seminar on the DR results. I visited Boston, New York and New Jersey along the way. I was lucky enough to attend Aretha Franklin's concert in New York at Carnegie Hall. Divine voice and phenomenal performance!

* * * * *

My second stay in Boulder was coming to an end. This was, with interruptions, the fifth year of my absence from Belgrade, including the year spent in the JNA. I was once again at a major crossroads in my life - should I try to stay here, return to Belgrade or look for a third solution. I didn't feel homesick, even here I didn't hang out much with my friends from Yugoslavia, or they were originally from there. I didn't avoid these gatherings when there was an opportunity, but I considered that it was more natural to spend time with people around me, to whom I was directed, than to be with someone just because we are connected by language or origin. I thought that I should learn and find out as much as possible from the environment where I currently live, about their mentality, habits, culture, and of course science. That is the meaning of travel. I partly accepted that from the Americans, they are in constant change, looking for a new chance, at any level. They are dynamic, they became independent early, and they often change their jobs and the city or country where they live. They are always ready for changes and new opportunities.

So, I was again in a dilemma, or rather a trilemme. America was still very attractive to me, but I felt it was time for a change. I surrendered to the flow of time and decided to return to Belgrade. I was still open to all three options, nothing was definitive, and I was determined to wait until I felt what I should do next.

A lot of obligations have accumulated at the Faculty in Belgrade. I met the requirements, but the procedure for advancement in my position had not yet been initiated, I had no specific responsibilities in teaching, the room intended for the research laboratory was not adapted, as was planned. I had a lot of work to do, as well as signing a research funding project with the Physics Board of the Ministry of Science and Technology Development. My second project for self-build instruments and equipment was approved, but not yet signed.

Research associate in the laboratory Miloš Vićić, Vića, worked hard even in my absence. He produced workshop drawings for a vacuum collision chamber, with four flanges, made of stainless non-magnetic steel. He also prepared all the technical drawings for the supports and the complete electrode system for the electron gun, the deflection electrodes for the double TEM and all the electrodes for the scattered electron transport, as well as the support system for the channel electron multiplier, the channeltron. All these parts will be made of beryllium-bronze alloy, a special non-magnetic material suitable for precision machining. We provided the material and manufacturing of the vacuum chamber in the workshop of the Institute of Physics, we obtained the beryllium-bronze alloy through an importer from

abroad, and we contracted the manufacturing with a recommended private individual, a former employee of "Teleoptik" from Zemun, an industry for technologically precise components of parts for optics, electronic optics and other dedicated components. In the end, all the beryllium-bronze parts had to be coated with thin gold, in order to avoid any form of their oxidation.

Since the laboratory was almost empty, it was an opportunity to arrange it, it was painted, the parquet was planed and varnished, and the electrical installations were reworked and reinforced. Some furniture, cupboards and tables remained from the old equipment; there was a built-in chemical chapel. There was one leftover mechanical pump and one old diffusion pump that the previous owners didn't want to take away, as well as several steel cylinders for high-pressure gases. Already at the end of the same year, a shipment of used but usable equipment arrived from Boulder, as a gift and support from Gordon Dan. It was a complete rack with NIM electronics, a PDP-8 computer and a printer.

An Agreement on interstate cooperation entitled "Theoretical and experimental research of atomic collision processes of interest for controlled thermonuclear fusion" was soon signed. This was part of the program of intergovernmental cooperation between the USA and Yugoslavia regarding the promotion of development. The signatories of the contract were Gordon Dan for NSF and Ratko Janev from our side. I was only a participant in the project, because at that time I did not have an adequate academic title. Btw, I participated in both the theoretical and the experimental part of the project, in the experimental one by measuring the cross section for

electron-ion collisions, and in the theoretical one because I wrote with Janev and B.H. Brandsden programs for numerical integration of cross sections for collisions of multiply charged ions with atoms and ions present in the plasma. The contract also had a clause for financial support for travel, as well as for the work and procurement of equipment for research in Belgrade.

From the first tranche of funds for the self-construction of the equipment, a vacuum collision chamber was made and material for supports was procured, as well as copper wire for winding Helmholtz coils, which provided a homogeneous magnetic field in the collision chamber for collimating the electron beam. Vića led the implementation of the aforementioned works with the help of a new technician. The collision chamber was polished inside, and winding two parts of 60 cm diameter coils, each with 400 coils, was a very demanding and tiring job. These were also the biggest hardware tasks, most of the equipment for providing the vacuum as well as the power supplies were commercially available. Fortunately, at the beginning of the following year, we received a quota of about 60,000 dollars from our Ministry and the NSF for the purchase of capital equipment. These were, for our conditions, significant funds. I chose the equipment and hired an agency to import that equipment. At that time, the procedure was complex and lasted more than a year.

At that time, I lived in a new apartment, in New Belgrade, in block 70A. I gradually got used to the new environment, renewed old acquaintances and made new ones. Coincidentally, I also started thinking about a new temporary

business. I lived on the very bank of the Sava, now on the left, at the height of Ada Ciganlija, a little below Ada Međica. I have loved the river since I was a child and often walked along the landscaped banks by the blocks. I noticed that there is a problem with crossing the river and going to Lake of Ada Ciganlija on Sava, especially in the summer. Some had boats, but there was no organized river crossing. The alternative was public transport, but it was far and unacceptable, especially in the summer heat. I acquired some business thinking in the USA and I suggested to my brother and partner, co-owner Uncle Mija from Obrenovac, that we try to hire our old scaffolding and motor boat for passenger transport on the route New Belgrade - Ada Ciganlija. It was a bit of a twisted idea. The country was still in the era of self-governing socialism and private initiative, especially in public transport, did not fit well. However, people accepted it, it was practical. The main actors easily agreed. I needed a little change, so I took a vacation and decided to try my luck in business. My brother Branko was a journalist worked as a photographer in NIN and loved unusual experiences. The third partner, Mija, was already in his mature years, but he was open, he claimed, to everything "from cold beer to fat roast." The captain and "motorist", Lune, was an ordinary, but hardworking and reliable man. An agreement was reached, to start work from July 1, until the end of August, in the period when the weather is nice, most people are on vacation, and schools are not open either.

A little earlier, we lowered the floating objects, the scaffolding and the motor boat, downstream from Obrenovac to Block 45 in New Belgrade. We carried out the necessary

work on the shore for the landing, cleaned the wooden floor and the protective fence on the scaffolding. We informed the Port Authority of the pier in Belgrade about the start of work. Transporters Mija and Luna knew the head and inspectors of the Captaincy because they had been cooperating on transport operations in Obrenovac for decades. They promised us that as soon as we start work, they will come to carry out the necessary inspections and work supervision. In addition, we wrote the working hours and informed the public media about the start of work. The main advertisement was on Studio B, which by default was in charge of notifications about the functioning of public transport in the city of Belgrade. The famous presenter Đoko Vještica directly included us in the program a couple of times, as well as on the day of the start of work. Advertising marketing was tried to be done by the previously mentioned cousin Mika Francuz, but the response of those interested was modest, because it was a private initiative. The day before the start of work, we organized the opening of a collective exhibition of paintings by several of our famous painters, on the scaffolding. There were guests among the audience, Professor Kurepa and his wife came as well as several other colleagues from the Institute of Physics and the Faculty of Physics, acquaintances, friends and a couple of my comrades from the JNA. Passers-by and walkers stopped and were interested when we started and about other details. The number of interested parties promised a good start to the work.

At the announced time of the start of the transportation, several pensioners gathered, looked around the facilities, some shook their heads, some got on board, and it started.

The team was well trained and experienced. We crossed the river to Ada Ciganlija in 6 minutes. The passengers left the pier and were satisfied. We returned to the other bank where a new group had already started to gather, there were also a few cyclists. The business went smoothly, the transportation price was affordable, and the transportation was fast. Word spread quickly. There were plenty of passengers. The pier on Ada was near the swimming pool and kayaking sheds, where there was also a cafe, and on the New Belgrade side at the end of Omladinske Brigade Street across the embankment, at the beginning of the quay, downstream from the restaurant-raft Bombay, in the shade of two huge willows.

On the second day after the opening of transportation, the Captain's Officer, the head of the Captain's Office and an inspector came for inspection. They inspected the facilities, took a tour and then sat on the terrace on the top floor of the Bombay to watch the scaffolding work from above and to make a report. Mija and Branko were with them. They didn't want to drink, but fish stew and kechiga were served as appetizers. Lune and I worked. He drove a motor boat tied "on the side" (sideways) to the scaffolding, and I lowered the ramps, issued tickets and pushed the objects away from the shore with a plank when the passengers boarded the scaffolding. The captaincy was correct. They made two justified objections. One was that we needed to record the bearings of the motor boat's drive shaft again because the validity period of the previous inspection had expired, and the other was that we needed to put the spare engine in running order in case the main engine stopped working. They issued a decision banning work until we eliminate those

deficiencies, and they will come to inspect again when we let them know. As Mija explained to me, it tacitly meant that we should continue working until further notice, and with the warning, they removed responsibility from themselves in case something unforeseen happened.

The business took off incredibly well. Weekends were the busiest. During the rest break, Mija opened a new cold beer, poured a little and crossed himself. This, he said, is more traffic than on Christ's Day (Krstovdan) in Obrenovac. Christ's Day was a big, autumn fair in Obrenovac, when for three days there was the highest traffic of people and carts of the year. Yes, we all agreed. But here every day is Krstovdan, he said and tipped the beer bottle so that the liquid could be heard gurgling down his throat. As the eldest, he worked less, but on his own initiative he slept in the cabin of the motorboat every night, for the protection and safety of the facilities.

I was in charge of transportation billing and finance. In the beginning, we had card pads, but those cards didn't do anything. We canceled them, because I was unable to collect and distribute tickets. The worst thing is that neither we nor the passengers needed tickets, we also had return tickets, but as a rule, whoever crosses the river must also return, so we combined them. Later we discontinued them and I was just raising money. It was sometimes so crowded that I couldn't collect all the money in 6 minutes, so I would signal to Lune to slow down in order to get the payment. I had one bag in which I kept money and which I had to empty frequently in the cabin of the motorboat. The earnings were good. However, we worked a lot, all day, from 8 in the morning

until 8 in the evening. We rested a bit around lunch, but it was hard during rush hours. When I came in the evening to the apartment, I used to be so tired that I swayed to the gurgling water in the bathroom and drifted to the rhythm of the waves on the river.

The days went by, and we couldn't wait for summer to pass. We had a psychological limit, and the weather started to deteriorate. Vacations were ending, and schools were getting ready for work. Somewhere in the second half of August, new state-owned scaffolding appeared in Block 70, belonging to the city's water supply company on Makish. Their competitive scaffolding was significantly larger than ours. She was slower to maneuver and turn on the banks. The organization was worse; the transportation billing process slowed them down because they were not flexible. After ten days, they gave up because they could not withstand our competition. A couple of larger motor boats also appeared, with larger troughs, up to 15 m long and with stronger "Tomos" engines. They went from Block 45 to both Međica and Ada Ciganlija and were more profitable than the state scaffolding. They could handle a smaller amount of work towards the end of the summer. As planned and announced, we worked until the end of August, and then we stopped work and took the facilities to Obrenovac for the winter. We ended the season, successfully and without the slightest incident, for that year.

Sometime in October, I received an invitation from the City Administration of Public Revenues from Novi Belgrade to come for the purpose of regulating the tax on work and the income generated during river transport on the route Novi

Beograd - Ada Ciganlija. I left at the appointed time and was received by a friendly employee of the Secretariat of Traffic. I explained to her that we have registered transportation in Obrenovac that is valid for the Sava River and that we regularly pay taxes to the municipality of Obrenovac. She pointed out that we should also pay the municipality of Novi Beograd because we were carrying out transport on their territory. I asked her if we should also pay taxes to the Municipality of Čukarica, since we also used their coast. She was a little confused and explained that she had to check it out. In order to help her, I showed the decision of the Captaincy of Belgrade on the prohibition of transportation issued at the very beginning of July, when we were only working on the second day. I asked her if they had any proof that we worked and in what period. In the end, I suggested that they calculate my tax for that one day and provide me with a solution. Of course I was joking. She smiled too and that's how the meeting ended.

All in all it was successful. We earned some money. We shared the money fairly; there were no lies or fraud. There are anecdotes about how musicians share what they have earned. They sit in a circle and the conductor puts the money earned on the pile. He takes a banknote and places it in front of the players in order, saying: Bank to me, bank to you, bank to me, bank to you... and so on until he divides everything. There was no such deception with us. With the money I earned, I bought a second-hand Renault 4 in quite good condition.

That's how the "transportation on the Sava" affair ended. The following summer, the water took us in different directions. I

believe that this experience was useful and successful for those of us who worked, as well as for fellow citizens from New Belgrade, who had a beautiful Summer. Since that year, several larger private boats operate on the transport to Ada Ciganlija and the transport is regular.

vii

At a seminar in Belgrade in the fall of 1983rd year, during a coffee break, I met again my colleague Janev from IF. We had a nice talk about what happened in the meantime. He returned from a one-month stay at the Catholic University of Louvain (UCL, *Universite Catholique de Louvain, Louvain la Neuve*) near Brussels. Word by word, we came to the topic of cooperation and working conditions at UCL. As a theoretician, he was occasionally engaged in the Laboratory for Atomic Physics and Quantum Optics (PAOQ) in the group of Freddy Brouillard.

The following January 15, when the first semester at the Faculty in Belgrade ended, I sat in the afternoon with Prof. Brouillard in the studio as part of the mechanical workshop of the Department of Physics at UCL. Freddy belonged to the generation of pioneers of modern experimental atomic physics, which developed after epochal discoveries in science, immediately after the great boom in nuclear physics at the beginning of the 20th century. He had disheveled gray hair of medium length, with a rough face always ready to smile and a prominent nose, his physiognomy somewhat resembled to Einstein. Of course, we spoke in French, because it was in the Walloon, French-speaking part of Belgium. In the other, Flemish part, a mixture of Dutch and German is spoken. I said we were sitting in the studio, so I

must clarify. In our language, the term studio or *atelier* is used more as a space for practicing painting or some other art. In French, atelier literally means a workshop, a place where something is done, whether it is a bakery, a shoemaker's shop or some other craft workshop. We were sitting in a real master's workshop where metal mechanical parts for equipping laboratories were made and where there were various tools. The machines were in the surrounding rooms. The room in which we sat was a collective place for rest, conversation and discussions, both for masters and researchers who gravitated to the work that the masters performed. There were several tables, cabinets with precision tools, a table for technical drawing, but also a microwave oven and coffee and tea machines. There were empty, but also some full, bottles of spirits and wines from various countries that the visitors had brought. Smoking was also allowed in this room. Freddy and Lega were the only ones smoking pipes. Every working day, at the end of working hours, one and the same group summarized the daily impressions, presented news and exchanged opinions about anything and everything. Freddie would arrive first, put the coffee to brew and take his usual place. I have the circumstances, for the next thirty years, until the big "Covid-19" pandemic, and I was a regular "member of the club". Every year during the holidays, from January 15 to February 15, I was there. They had already started joking when I arrived on the first day; they said "today must be January 15".

The second, much more important clarification concerns the distinction between KUL and UCL universities. The first is older and is located in the Flemish region, and the second in

the Walloon part of Belgium, that is, in the French-speaking area.

KUL Leuven (*Katholieke Universiteit Leuven*) was founded in 1425 and was one of the oldest university centers in Europe. Its seat is located about 30 kilometers east of Brussels. Through the ages and empires, it has been the target of contested French and Dutch influence. After a series of controversial changes, that old university was divided in social turmoil in 1968 into two sister universities, and in 1970 it was founded as a Greenfield scientific investment by the Belgian government and this new UCL Louvain-la-Neuve (*Université Catholique de Louvain-la-Neuve*) university, located southeast of Brussels, nearly at the same distance as KUL. Since 1972, this part has been independent as a Leuven Research & Development (LRD) entity, with large investments and strong spin-off technology companies (such as Metris, TOLEDO, and IBA).

The backbone of the UCL Physics Department was the cyclotron CYCLONE, a brutal, crude architectural complex built from 1970 to 1972 in Louvain-la-Neuve, Walloon Brabant, Belgium. It was the first building built by the university, when it moved after the so-called Louvain crisis and there was the largest cyclotron in Europe at that time. The Cyclotron Resource Center (CRC) was a strategic technology platform of UCL. It had two categories of activities: 1) component testing with heavy particle ion beam (HIF), proton beam (LIF), neutron beam (NIF) and Cobalt-60 source (GIF); 2) production of microporous membranes.

It seems that the senseless tensions between the two entities, KUL and UCL have weakened over time, so in the last decades they started to celebrate the Patron Saint's Day together, which falls on the first day of the second semester in February, with a procession, the awarding of honorary doctorates and other titles, as well as other ceremonies. At the first joint celebration, held in Louvain at the beginning of this millennium, I myself was present. I say senseless tensions, making an allusion between the Louvain crisis and the development of events in the former Yugoslavia, at the end of the 20th century, as well as after that, until today. The example of Belgium shows all the nonsense of nationalism and separatism on the one hand and the importance of tolerance and the development of civilization values on the other. These questions are broader and more complex than the above examples and lead us to reexamine the entire religious, historical and cultural heritage of humanity, which we will return to later.

Freddie Brouillard group had three large laboratories. When I arrived, most of the investment was in the Heavy Particle Laboratory, HIF, which was located right next to the cyclotron, using the same ion source when it was available. A new powerful apparatus for cross section measurements for the ionization of multiply charged metal ions with electrons of energies of several tens of keV was completed. Unlike most classical experiments with crossed beams, a new original method of prof. Brouillard with a moving - animated beam of electrons, which, by applying "saw" voltages on the switches, swept (in a linear sweeping, see-saw mode) the path over a static ion beam, like windshield wipers on a car. In this

elegant way, the determination of the so-called „form of the collision factor" is avoided, and the synchronization of the signal with the deflection voltage allowed the direct subtraction of noise from the total signal during measurement.

Due to the use of the ion beam from the cyclotron for other experiments, the measurements had to be performed synchronously and continuously. When the beam was obtained according to the schedule, the measurements were made without stopping, which means also at night, so we also made night shifts. Usually, PhD students worked in these shifts because they needed the results to write their thesis. Most of them were foreign students. Said from Morocco worked with me in the beginning, he was a little slower, but he worked correctly. Another student, Chang, from China, worked with Belgian Pierre Defrance, a junior member of Brouillard team. The program included Hind from Morocco, Sophie from Belgium and Eric Bahati from Congo and later Julian Lecointre from France. Let's not forget that Belgium was a strong colonial power country, and for that reason there were foreign students in regular and especially doctoral studies, in all study programs at UCL. If they completed their basic studies in their countries, it is to be expected that the level of their education was somewhat lower, so differences were made between domestic and foreign students in terms of the diplomas they received at UCL. Only the best students from abroad received the highest grade (avec grand distinction) and had the right to apply for positions in Belgium itself.

Louvain-la-Neuve (LLN), or translated from French as New Louvain, is a planned city, founded in 1968 in the district of Ottignie in the province of Wallonia Brabant, located 30 km southeast of Brussels. It was built as the seat of UCL. It has about 30,000 inhabitants and receives about 5,000 students. Before that, the place was rural, sparsely populated and included several dozen farms of the local population. The farms have a garden, they were built of stone and brick, they were bought and renovated and today they are used either for housing, or as restaurants, art studios, for holding gatherings, but also for organizing celebrations, exhibitions or large concerts. Everything else is new. A new traffic infrastructure, a railway station, administrative buildings, libraries, university and faculty buildings with large amphitheatres, a new large cathedral, as well as residential areas were built. New settlements are mostly single-story buildings, but there are more and more high-rise buildings. What is unique in the city center is the new architecture that separates vehicular traffic and pedestrians. The hilly terrain was used so that traffic roads were built on the lower levels, and the higher terrain was connected by platforms on pillars on which there are connected pedestrian zones. In this way, a pedestrian can cross from any part of the city to the opposite part without having to cross a single street with traffic. There is a lot of interest in such unique and very practical urban planning solutions, urban planners come and seminars are organized about it. The central places in the city are certainly the University Square and the Grand Place, surrounded by many restaurants with cuisines from various countries and continents, bookstores, libraries, computer and accessory

stores, cafes, pastry and beverage stores. You should not be surprised by the range of wines on offer, but what is the wealth of France in wines, that is the case in Belgium with the selection of beers. They say that Belgium, with over 300 types of breweries, secrets developed and kept by monasteries, is the richest in the world in terms of beer selection. There is certainly an incredible selection of sweets and especially chocolates made from first-class raw materials from the former colonies.

The rhythm of life in the city is linked to the university. However, after the construction of the L'Esplanade shopping complex, the Aula Magna exhibition center and auditorium, a large complex of cinema halls, and five museums, the city began to develop beyond its academic framework.

The best connection of the city with Brussels and the airport is the trains, fast - for bigger places and slow - which stop at every station. According to the accuracy of the timetable, the accuracy of the clocks could be checked, which is now easier to do with mobile phones.

In Belgium, a lot of attention is paid to Saint Valentine's Day, which falls on February 14. Until then, there are also big sales of clothes, shoes, perfumes and cosmetics and generally beautiful things that are usually given as a sign of love and attention to loved ones. In Serbia, on the same day, Saint Tryphoon, which is also a religious holiday, is known as the Day of Love and Wine. Depending on the calendar and the availability of flights, I usually returned to Belgrade with gifts, because on February 15, the second semester and regular classes at the University of Belgrade began.

viii

Building a complex experimental device for atomic collision processes at the Faculty of Physics in Belgrade was a Sisyphean task. I fully understood that only after returning from Belgium. There, in the building where the cyclotron is located, there were several workshops for processing large pieces of metal and other materials, for precision mechanics, electronics and various specialized services for electronic and laser optics. Here wasn't even a real mechanical workshop for metalworking, at the university. A few years earlier, when the Institute of Physics moved to Zemun, the workshop was also moved. They had solid equipment, lathes and milling machines, as well as two excellent craftsmen and constructors, Peđa and Puškaš. They were willing to do small-scale work for us outside the Institute, but they were too busy with "projects with the industry" that bound them to fixed deadlines. We mentioned one such project in connection with the production and control of gas masks with “Namenska Industria” in Kruševac, and in the current period they were engaged in solving pressure control on large rotating tanks and mixers, which "Prva Iskra" from Barič did for a foreign client. There was neither an organized electrical nor an electronic workshop at the faculty, nor a qualified auxiliary service for computer technology and programming. It was mostly done out of enthusiasm and based on personal initiative.

The capital equipment that was ordered from imports has not yet started to arrive from abroad, most of it was supposed to come from the USA and West Germany. What could be made in Belgrade, a vacuum chamber with flanges, has already been made. It was time to make Helmholtz coils to ensure a homogeneous magnetic field. Imported coils were expensive and we didn't have money for them, so Vića did the calculations and we decided to make them by ourselves, in the laboratory. For this purpose, we bought about 5 km of insulated, varnished copper wire with a diameter of 1 mm from the copper rolling mill in Sevojno. That wire had to be wound on two separate coils, without a core, on each coil with a diameter of 60 cm, 2500 coils, and profile 50x50. It was necessary to develop a special tool for winding the spool. A wooden roller with a diameter of 60 cm and a thickness of 50 mm was made for this. A 72 cm diameter coaxial circular plate was attached to it laterally on each side, making a circular groove for the coil, and the whole thing was mounted on a pivot around which it could rotate. The wire is carefully wound in layers of 50 turns each, and each layer is fixed with melted shellac and dried. Thus, 50 layers were formed for one coil. The procedure was repeated for the second coil. Of course, the chief engineer and contractor was Vića.

That semester, I held computational and experimental exercises in molecular physics. At the same time, I also received a newly introduced course in Applied Physics and Informatics under the unfortunate name "Man and his Environment". I mention the unfortunate name because even according to the program it was not about "man" but about "Physics of ecology", as the course was soon renamed. The

adopted program was short, and no literature existed at that time. I had to specify the topics, prepare and give lectures and exercises. It was hard work, but it was a fortunate circumstance that I was dealing with atomic and molecular physics, since it is the basis of all ecology and pollution problems, which at that time attracted increasing attention at all levels. The issue should have been viewed in a complex manner, from all aspects, but the focus was placed on the air, the composition and properties of pollutant molecules that appear as pollutants, and in connection with this, the methods of their detection, concentration measurement and procedures and measures for the preservation and purification of polluted waste gases. The topic was interesting to me, and judging by the reactions, I would say the same to the students. Discussions were often developed and examples and procedures of pollution in the local areas where the students came from were described. Among the students there was also a group of those who completed physics at the Higher Pedagogical School, so they enrolled in additional subjects to be recognized by the faculty. They were extremely active in class and came regularly. Women were particularly interested in the application of various chemicals in the kitchen and Teflon on kitchen utensils. The men, on the other hand, discussed the quality of the fuel and the differences between gasoline and diesel fuel. It was interesting for me to analyze the possibilities of applying the most diverse physical methods and reactions that could be used, such as the scattering of electrons and photons in the form of absorption and scattering of light on atoms and molecules, fluorescence, phosphorescence, vibrational excitation, mass spectrometry,

the use of laser radiation, as well as some chemical and physical-chemical methods. I tried to collect as much literature as possible, some to distribute to students, and some to prepare material for the script in the shortest possible time, which were also missing. As for the experimental exercises, I used selected and adapted exercises from Molecular Physics and from several research laboratories from the Faculty and the Institute of Physics in Zemun.

At the beginning of the summer, I met a colleague from my generation - Ćira, who graduated from the so-called "Heavy Physics" at the Faculty of Electrical Engineering, majoring in nuclear physics, and worked for a time at INN Vinča. In the last year, he was on postdoctoral studies at the FOM Institute (Institute for Atomic and Molecular Physics) in Amsterdam, in the Netherlands, with prof. De Heer. We talked, among other things, about research. He saw an article about DR from Boulder and invited me to Amsterdam to give a seminar. I agreed to go for a few days when I will be in Belgium again. Indeed, the following year I gave a lecture and De Heer found the DR process very interesting. He invited me to write a larger article about it for the journal he was editor of, "Comments on Atomic and Molecular Physics." That's what I did, together with a colleague from India, with whom I collaborated in Boulder. It was theorist Anil Pradhan, so we wrote a review article covering key experimental and theoretical aspects of the process. It was a pleasure for us, because at that time it was not common to write by invitation for a scientific journal.

By chance, at the beginning of my academic career I spent a lot of time abroad and I liked it. Research was a chosen

calling for me, but also a constant interaction with ideas and people. I felt it should stay that way. The interaction with people from the faculty was less developed, due to the long absence, but in any case correct and respectful. I loved working with students, lectures and exercises, and I missed that to some extent during my absences, because then I was almost exclusively engaged in research.

I was getting more and more used to the idea of staying at the faculty in Belgrade, but making it a base for cooperation with other university centers and institutes in the country and abroad. I don't know if I was becoming more inert, but I was turning more towards Europe. I still went occasionally to the USA, but also to France, and most often to Belgium. In the first few years, I stayed in Belgium twice a year, then, when the experiment in Belgrade worked, I went only once, during the winter break after the first semester, for a month. However, this stay meant a lot to me. It allowed me to "recharge my batteries", to refresh my work habits, to be in contact with the latest literature, to stay abreast of events by attending seminars, symposiums and conferences in the surrounding countries. The working atmosphere at the university was too relaxed, this trip would shake me every time, it would motivate me to prepare something new before the trip, as well as to work on the interpretation of the obtained results after the stay. I gained some new fitness and energy that kept me going on for the next few months, and so on and on.

The situation at the university, after all, as in the whole country, was marked and burdened by socialist self-management, meetings and discussions. Informal interest

groups were formed, so-called cliques, mostly on issues related to power, from the faculty upwards. The electoral combinatory was created, related to the elections in the profession, but also the delegation of representatives to the University and the Ministry of Education and Science. The party had its own structures and largely determined and influenced professional affairs, which certainly had potentially bad consequences. I did not want to join the party. I tried to stay out of those circles and deal with my work, teaching and science. I was also able to express my opinion on various issues and I did not shy away from that or give up. As such, I stood out, stood out from the environment. I was against the fact that certain positions are held for too long, that work obligations are not fulfilled under various excuses, that selections for positions are carried out in a stretched manner, in violation of the existing rules, that assistants are chosen based on suitability, etc. According to the elaborate methodology, various stories and half-truths would then be allowed to circulate, but I did not give up my principles. I fought for the principles that are valid in other environments and countries, where the rules are known and acted upon.

I was exposed to criticism, for example, that I was not sufficiently involved in social issues. I was once elected as the vice-dean for finance at the faculty, although I thought it was not good to do it voluntarily, without sufficient knowledge of the subject, it should be done by trained professionals. I tried for a while to do it, as much as I could. Then a group of people asked for an increase in salaries, i.e. personal income of employees. I reviewed the state of finances with the head of PMF accounting and made sure that

there was no possibility for that. Then the signing of the petition for my dismissal began, which I welcomed and I myself resigned irrevocably. Another example was the reorganization of PMF and its division into six independent faculties, for chemistry, mathematics, physics, physical chemistry, biology and geography. In principle, I was against it, because I thought that it was not rational and that it would only multiply the administration and increase business costs. My objections were rejected very easily, because the political machinery was behind the proposal, which projected new positions for six, instead of the previous one, dean. Behind those ideas stood the City Committee of the party (KPJ, SPS, JUL), informally headed by Slobodan Milošević's wife dr. Mirjana Marković as a professor of sociology at the then PMF. I write this only from the aspect of the role and influence of politics on PMF, which is the subject of interest here. Prof. Jagoš Purić also had a role in the mentioned events, as dean of the same faculty, later rector of BU, and also Dr. Milan Božić from OOUR Department of Mathematics and Mechanics at the same PMF. By the way, as far as I was informed, Purić had a young daughter, whom Božić married, and Marković was the godmother - just like in the good old dynastic fairy tales. You don't have to go far; there are examples in our history where pacts between countries were created through children, that is, their marriages. Blood is not water.

The next period January-February `84th I spent again in Belgium, I worked on a new ionization experiment of ions with a high degree of charge from an ion source from a cyclotron device. That experiment was well-designed, stable,

and highly automated. When the target is chosen, all the parameters are set according to the developed algorithm and the results remain to be collected. The measurement range and duration depend on the energy and charge level of the ions. Materials used in fusion machines and which can be found in fusion plasma were chosen for modeling its parameters. The work on this experiment itself was somewhat monotonous, routine, and did not bring excitement. Doctoral students could, after a short training, successfully do this job themselves. Another thing I didn't like was the constant synchronization with the cyclotron operation and the limited time for work. To be honest, I was also bothered by the residual radiation from the cyclotron, which had to be monitored with radiometers even when it was out of operation. What would be a challenge for me would be working with molecular ions and researching molecular reactions and degrees of freedom of movement of fragments. I had a long discussion with Brouillard and Defrance about this. There were many questions and sub-questions. It turns out that the collisions of electrons with molecular ions have been little investigated, but they are very important for any plasma or discharge in gases. In addition to their significant role in maintaining the energy of the particle system, they further affect the balance of electrons and other charged particles through the processes of recombination, ionization, dissociative excitation, and dissociative ionization. The arguments ranged from disputing to extolling the role of molecular ions, as well as the formation of new molecular particles. My thinking led to the conclusion that it would be useful to activate a new experiment to investigate the

aforementioned processes. The fortunate circumstance was that it could be done quickly and with minimal investment. Namely, there was a complete old apparatus for collisions of electrons with ions, which was replaced by a new one with ions from the cyclotron. The old apparatus was dismantled and moved to a separate laboratory in another part of the building. Only an ion source for molecular ions of lower energies was missing. As an ion source, a modified small Colutron PIG (Penning Ionization Gauge) source, which existed here, and which I used at one time in Boulder, USA, for atomic ions, could be used. We agreed that Defrance would continue to work on the new apparatus with atomic ions, and that the technicians would revitalize and equip the old apparatus on which I would start working with molecular ions from my next arrival.

Since I was an assistant in Belgrade for a long time, albeit with a doctorate, in `84th I was elected to the position of scientific associate and the procedure for selection to the position of assistant professor was initiated. In the same year, equipment for the new laboratory in Belgrade began to arrive. A new vacuum stand has arrived with a large mechanical and diffusion pump. The stand is connected to water from the water supply for cooling the diffusion pump and a newly built vacuum chamber is mounted on it. Helmholtz coils for the magnetic field are mounted on a special support with a device for centering and directing the field. By measuring the resulting fields, we found that high homogeneity of the magnetic field was achieved by making the coil, with a precision below 1% in the actual used volume in the center of the vacuum chamber. It remained to complete some more

current and voltage feeders, and most importantly, to complete the installation of the electrode system of the device - which was the main part, so to speak, the heart of the experiment.

The year 1984 is mentioned several times in this text. Not without reason, because it is associated with the nausea caused with me by the appearance of Michael Radford's film "1984", filmed in the same year based on George Orwell's novel, published in 1949. I saw the film the following year at the Cineplex, when I was again in New Louvain, Belgium. The novel describes an extreme totalitarian society and the life of an individual monitored 24 hours a day. The subject matter is directly related to the Stalinist regime and the cult of personality, which is why the novel was considered potentially politically dangerous, so it was banned in some countries. After the death of Tito, the weaknesses of communism, that is, socialism, as a system of government, began to surface in Yugoslavia. Since 1981, after large demonstrations in Pristina, with human victims that were kept silent, open conflicts began in Kosovo and Metohija, but also throughout the country, especially in the highest circles of the communist party. It was difficult for anyone to predict how things would develop further. The outlook was bleak. Following the further development of events, the question arises whether we really strive for an extreme totalitarian society and a supervised life, with a Stalinist regime and a personality cult. How long can one live in a totalitarian regime? How long can supervision last? How many generations does adaptation take? When to expect socio-genetic consequences or irreversible reflexes? Since 1917, a

century has passed; a large portion of the Earth's population has participated in global uncertainty.

After the movie, I took a long walk. To dispel my thoughts, I went to the laboratory; where the programmed apparatus worked by itself, in order to achieve high statistics at low collision energies.

The experiment with molecular ions in New Louvain was quickly trained and tests were carried out on simple diatomic and triatomic molecules of nitrogen, oxygen, carbon monoxide and carbon dioxide. Let's remember, it was about the so-called moving, crossed beams of electrons and singly charged primary ions of molecules and detection of positively or negatively charged secondary ions of molecules or their fragments, separated by a magnetic analyzer, which can be charged with one or more elementary charges. In contrast to atomic ions, whose spectra were very narrow and flattened, completely different mass spectra were obtained for molecular ions. They were asymmetric, much wider and had a complex Gaussian bell shape, with no visible plateau. At first, it was an unpleasant surprise, which, with the absence of a signal plateau, suggested that it would not be possible to determine the absolute values of the cross section. I spent the end of that week and the weekend analyzing the structure and shape of the expected spectra.

The first important conclusion related to the greater spectrum width of molecular ion fragments. It is a consequence of the dissociation of molecules, whereby part of the internal energy is transformed into their kinetic energy. After the collision, ions with different velocities and random orientations appear,

which, under the action of the Lorentz force in the magnetic field, cause the spectrum lines to broaden.

In collisions with electrons, three basic processes of ion-molecule transformation occur. The simplest is the first process of direct ionization, which is called simple ionization - **SI**. A doubly charged positive ion with unchanged velocity is obtained and is seen in the spectrum as a narrow peak with a flat plateau. The second process is the so-called dissociative excitation - **DE**. It is created when the molecule is first excited into a repulsive state of potential energy and then dissociates from it into two fragments, one of which is singly positively charged. Thus, one charged fragment with a smaller mass than the primary ion is obtained, which due to dissociation has a wider spectrum. Usually, its width is greater than the width of the detector and does not have a plateau, but has a Gaussian shape. The third possible process is dissociative ionization - **DI**. The molecular ion is simultaneously ionized and excited, and usually two charged fragments are obtained. These two fragments are charged with the same name, so they repel each other with the Coulomb force (Coulomb explosion) and have significantly larger spectrum widths than DE. If the molecule is homonuclear then all three lines in the spectrum coincide in the magnetic field, since their specific charge Q/M is the same for DE, DI and SI products. The total signal has a complex shape, it consists of the contribution of one broadest peak without a plateau, which originates from DI, a narrower Gaussian, from DE, is added to it, and a narrow flattened peak with a plateau, from SI, is added to their sum. The contribution of these fragments changes with the energy of

the incident electrons, and it is difficult to separate the processes and contributions of individual fragments and determine the absolute cross sections for each of them. That is the interesting part of this experiment, which I assumed, and which brought excitement to these investigations.

The visual form of the total, just described, signal is interesting. It closely resembles the shape of the Eiffel Tower in Paris, with three platforms that have a similar geometric structure, but of course, that's just a coincidence.

On Monday, I brought a sheet of paper, with hand drawn possible secondary ion spectra, in the shape of the Eiffel Tower. I invited Brouillard and Defrance for morning coffee in the "studio" for a briefing on the structure of secondary ions. The abscissa axis had the distribution of the expected values of the analyzer's magnetic field in gauss. The ordinate represented the relative intensity values of the detected signal. The drawing showed the possible shapes of spectral lines for different processes. It was just a sketch for the case of the nitrogen molecular ion, N_2^+. Prof. Brouillard smiled contentedly and nodded his head. Pierre Defrance was more critical, he was skeptical from the beginning of the project. Measurements later showed that the sketch was quite comprehensive, accurate and useful. We stayed in the discussion for a long time, and then Freddie took us to lunch where we continued the conversation. We agreed to continue the work, focusing on a couple of unfinished aspects. Namely, it was not yet clear (1) how to separate ions of different masses with the same charge-to-mass ratio, Q/M, and (2) how to determine the total measurement signal for

dissociative fragments without profile fitting and integration. For the first question I had an idea of what to do, and for the total signal I had a strong feeling that it could be determined in a very simple, elegant way, which I had not yet formalized. Of course, it remains for us to work together further on this, as well as to create an automatic program for processing the results. Also, it was agreed that we consult theorists from the Free University of Brussels and the Forschungzentrum of the Julih Institute in West Germany about interesting molecules that are of importance for fusion plasma and for which it is necessary to determine molecular ions and fragments for which data on effective cross sections and ionization rate coefficients are missing, and their dissociation in plasma.

It is interesting that ions of different masses, with the same charge and mass ratio, Q/M, have the same trajectory in a homogeneous magnetic field and it is impossible to physically separate them. It is one experimental limitation that occurs in mass spectrometry and is often a problem for physicists. An example of this is the considered case of the ion of the nitrogen molecule. Products N^+ and N_2^{2+} which have Q/M equal to 1/14 will fall on the detector along the same path. Their separation is still possible by detailed analysis of the signal from this experiment, and we have confirmed and published it. These results were published in Serbia in the journal JSCS (Journal of the Serbian Chemical Society), for "patriotic reasons". The work met with enviable interest and was listed and cited dozens of times in the relevant foreign literature.

Separation of ions from various processes of interaction with electrons is performed at the maximum value of the total cross section for scattering, at about 100 eV, at the energy at which all three mentioned processes occur. The spectrum shows a bend in the structure of the spectrum that includes its "outer" parts. It is surely part of the DI signal. These parts are fitted with a Gaussian, and then this Gaussian is subtracted from the total spectrum. The difference is fitted with a new Gaussian, except for the part below the narrow peak of the SI signal. The DE contribution is obtained and its subtraction gives the SI signal. By integrating the respective contributions, a signal is obtained for each of the three observed processes, and with it the absolute values for DI, DE and SI effective sections are determined. A similar procedure is carried out on other electron energies, which covers the entire measurement range.

As for the shape of the spectrum of the dissociation signal, a clear question immediately arises, why that spectrum is so broad and why it does not have a plateau, as is the case with the SI signal. As already stated, this is due to the transfer of the internal energy of the part of the potential curve in the Franck-Condon area into the kinetic energy of the dissociation fragments; their energy changes and the beam expands. If in the area of the detector the width of the beam is greater than its diameter, some of the ions are lost. In order to make a correction for that loss, it is necessary to reconstruct its origin. The spectrum is recorded by carefully moving the signal beam across the detector by varying the analyzer's magnetic field in equidistant steps of one or half a gauss. In this way, the signal seems to come alive. I thought about this

problem most often when I was traveling by train to go shopping in Brussels. It is interesting how the monotonous movement and the sounds of the tracks on the railway positively stimulate deep thinking about some problems. It became clear to me why some famous thought experiments are related to the movement of the train. I usually didn't have a pen and paper with me then, but I felt that I was close to the solution and that the solution was within reach, as it were. The movement of the beam of light when entering and leaving the opening of the tunnel helped me in my search. I imagine a circular beam of signal passing through a narrow slit. Initially, its intensity passing through the tunnel is small and increases as the beam moves to some maximum. When part of the beam crosses the entire slit, the signal will begin to decrease, until the entire beam passes through it. The decay rate of the beam is equal to the rise rate of the signal initially. How much signal will pass depends on the width of the slit, let that width in gauss be equal to ΔB. Based on that, it clicked for me that the connection between the true signal intensity, i.e. of absolute section σ_{abs} and measured i.e. apparent section σ_{app} given by the following simple relation:

$$\sigma_{abs}(B)=\sigma_{app}(B)+\sigma_{abs}(B-\Delta B)$$

The equivalent width of the detector, ΔB, is most easily determined with the help of the narrow spectrum SI, or as the width of the spectrum measured at half height. The result of the application of the mentioned relation is the reconstructed plateau of the measured signal, i.e. the value of the absolute effective cross-section for the investigated process. This

finding was easily verified numerically and was proved by a series of measurements performed for specific examples on different targets. Over the years of research, it has been successfully applied to the ions of molecules N_2, O_2, CO, NO, ND, CH, CD, CO_2, C_2D_2, CD_4, etc. In most cases with molecules or fragments containing hydrogen atoms, due to a more complete separation of products, isoelectronic contents with deuterium atoms D instead of H, i.e. with a larger mass, were used.

In Belgrade, the assembly of the electrode system of the new experimental device was completed and its testing followed. A satisfactory vacuum was achieved with the new diffusion pump and soon a stream of electrons was obtained for the first time. With the usual small adjustment of the voltage on the electrodes and the direction of orientation of the magnetic field, a stable current of primary electrons of the order of 100 nA was obtained. That was enough to work with. As the first working gas, nitrogen was used, as a non-reactive, neutral gas, with a known electronic structure and cross sections for resonant scattering of electrons of lower and medium energies. It was the best choice, with rich literature, for testing the operation of the apparatus and its calibration. Everything worked correctly and we started measuring the excitation functions of the vibrational levels over the lowest resonant $^2\Pi_g$ state of the nitrogen molecule. Vića was excited and proud of the first results. He was so engaged that he drastically reduced his cigarette smoking, otherwise he used stronger ones, without filters, which I constantly objected to and tried to convince him not to smoke in the laboratory. We got another student as a technician to work in the laboratory,

his name was Milorad. He was from Vica's generation and was also an enthusiast and "omnivorous" that is, as we called him a jack-of-all-trades, because he thought well and managed to make everything, from needles to electronics and computer programs.

The measurements started well, in a month we recorded the excitation functions in the first 10 vibrational levels of the ground $^1\Sigma_g^+$ state. Comparisons were made with the latest results published in Michael Allen's doctoral dissertation, defended at the University of Fribourg, Switzerland. The agreement was extraordinary. The numbers of peaks in the functions were the same, and we got the impression that in our experiment there is a possibility for an additional increase in the measurement resolution. We decided to further address the improvement of the resolution. Vića was up to date with modern trends and innovations in computer technology in the world. He managed to design "windows" on our PC and monochrome monitor and to introduce automatic selection of operating modes and setting of parameters, i.e. visual control of the experiment resolution. He knew that these were powerful tools, and the rest of us were not even aware that this was the forerunner of the Windows system, which was then starting to develop in America. We watched in disbelief as the drop-down menu opened and the spectrum's appearance on the monitor changed synchronized with voltages. "It looks strange, but it works".

Vića's idea was that in the so-called energy loss spectrum introduces a real-time display of the electron beam detection signal. The display would be in the form of a histogram in an

odd number of points, which would contain the height and width of the distribution of electrons by energy. That histogram would include both the monochromator and the electron analyzer simultaneously. The change of individual voltages on the electrode system would directly reflect on the shape of the histogram and provide information on the current resolution of the experiment.

For the stated idea of visual control of the energy resolution of the experiment, Vića did not need any consent or opinion, because the rest of us could not even have a different opinion. In the shortest possible time, he wrote the algorithm, connected the components and showed us how it works. We were fascinated. Instead of changing the parameters and recording the spectra, an "in vivo" animated spectrum simply appeared before our eyes and showed how the electrons move through the system and how we can reach the optimal conditions for conducting the experiment. The signal shifted, the spectrum narrowed and widened, its intensity waxed and waned, like in a magical cartoon. Once the parameters are selected, the experiment is switched to the measurement program and the entire spectrum is accumulated for the selected energy interval and preset recording time.

Under these working conditions, we managed to do more in a week than we did in a month in the beginning. We worked with better resolution and statistics and were able to capture spectra with much more detail in the structure. Details of the substructure coming from vibrations in the electronic resonance state were clearly seen. We saw asymmetries and splits on certain peaks that had not been seen before, for example on states with vibrational quantum numbers 6 and 7.

They were explained by the mixing of higher quantum levels of the ground state with vibrational resonance levels. The measurements were extended to higher vibrational levels as well.

The experiment was also performed for higher electronic states. Basic and higher energy states of molecules N_2, CO, CO_2, H_2, CH_4, C_2H_2 and others were analyzed.

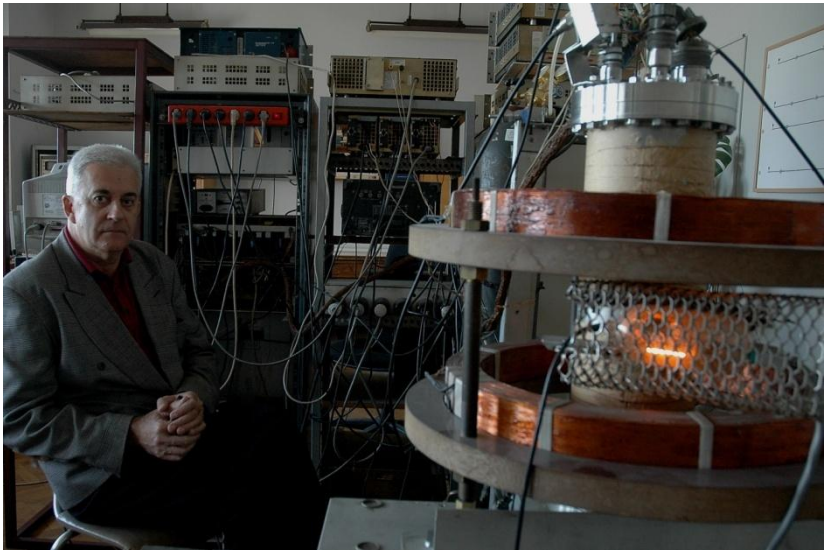
The analysis of the movement of scattered electrons on molecules in the described experiment, as already mentioned, is based on the principle of operation of the trochoidal electron monochromator, TEM. It is a complex motion in the space of a normal homogeneous electric field E and a vector of longitudinal magnetic induction B. The primary electrons are directed along the vector **B**. For a given drift velocity, E/B, the dispersion element of the device is the component of the velocity of the scattered electron in the direction B, where there are detected only electrons from a small spatial angle around that direction, forward to 0^o. On a couple of occasions, at international symposia, I discussed the results with Michael Allan and we agreed that this is a current limitation of this device, but that it could be otherwise applied very usefully.

The question arose as to what happens to those electrons that scatter along the axis of the device backwards, at 180^o, and whether they can also be detected. This assumption was confirmed, but we had no evidence for it yet. Upon my return, I discussed this issue in detail with Vića, Milorad and a new student, Goran Poparić, a graduate. Now we were already a serious group, not to say a team. I put forward the

hypothesis that, before reaching the thread, electrons scattered backwards, due to the loss of energy during the collision, bounce off one of the negative potentials on the electrodes and pass through the collision chamber again, i.e. they move towards the detector along the same trajectory, they just have a certain time delay, they lag behind the forward-scattered electrons. In this way, two groups of electrons are obtained on the detector, one of those scattered forward and a long one of those scattered back. In order to separate them, the electron beam can be modulated (chopped) and a time-of-flight analysis of the detected electrons can be introduced. For that we needed a TAC (Time to Amplitude Converter) converter, which we didn't have. TAC converts the time interval from the appearance of the electron in the chamber to its detection, into an electronic pulse of the appropriate amplitude. If we mark the arrival of the electron as logical start, and the detection of next beam pulse as stop, the time (inverted) between them gives in TAC a new electronic pulse about the event. In a multichannel analyzer, MCA, these pulses are registered in the electron scattering spectrum.

We did not have the devices listed here, MCA and TAC in the laboratory, nor did we order them with previously purchased equipment. But we knew that they existed, still in good condition and not being used at the moment, in the Laboratory for Nuclear Physics, on the same fourth floor of the faculty as our laboratory, and we had good relations with colleagues from that Laboratory. So there was no reason not to try to separate the electrons and thus obtain the differential effective cross sections (DCS) ratios for electron scattering

on molecules at 0 and 180 degrees. We started the experiment as soon as possible. Colleagues from nuclear physics were more than willing to help us, both with borrowed equipment and with the experience they had. At the end of World War II, nuclear physics reached the peak of its development, on the one hand in scientific terms, and on the other in technological development and the development of the atomic bomb and nuclear technology. Forty years later, the situation has changed, but other areas of physics have also left a great legacy in terms of equipment and training for work.



With the help of the nuclear people, we installed the borrowed equipment and checked that everything worked on our experiment. We received a signal and tried to search for a maximum by choosing suitable incident energy above the threshold for resonant scattering. Immediately above the threshold, the scattered electrons have low energy, so it is

expected that their speed is also low enough to separate the backscattered electrons from the forward ones. However, at the very threshold of the scattering energy, the signal is very weak, so we were unable to see the separation. We concluded that in order to separate the forward and backward scattered electrons, it is necessary to work at higher energy, but then a retarder or RPD (retarding potential difference) should be installed before the collision chamber, which would sufficiently slow down the backward scattered electrons and increase their flight time. We opted for the simplest variant, a system of two flat parallel plates 25 mm long, placed parallel to the incident electron beam. We had such electrodes made, in reserve, when we were making the electrode system, and they could be easily used. They were mounted with the help of six rubidium balls that were used to mount the other electrodes of the system. We opened the vacuum chamber, mounted the electrodes and launched the measurement. Two spades have been won! The rest was for the story and for publication in RSI (Review of Scientific Instruments), as well as for writing the first PhD in this field in our new laboratory.

We chose CO and H_2 molecules for measurement, because based on theoretical analysis they had different ratios of DCS at 0^o and 180^o. Those ratios for some states were equal, for some smaller, and for some greater than 1. Our results confirmed those ratios, which legitimized us to perform measurements on all other states and on other molecules, for which this ratio was so far unknown.

From the second half of the 80s, my base was in Belgrade. I worked at the university, I went regularly every year to Belgium, occasionally to the USA and France, to congresses

and symposiums of physicists in Austria, Italy, to conferences in Šibenik, Dubrovnik, Sarajevo. I wrote the textbook in Physics I and I finished the textbook for the subject Physics of Ecology. Ecology attracted me, and I spent my days flipping through the literature, websites, and publications of the US EPA (*Environmental Protection Agency; https://www.epa.gov*), which was the undisputed leader in the field. I finished writing 270 pages and the manuscript was reviewed in 1989 at the Faculty of Physics, which was also the publisher, and it was printed in "Studio plus" in Belgrade. For a long time, it was the only textbook on ecology in our language, in what was then Yugoslavia.

ix

I still lived in New Belgrade, although I signed a contract for the construction and purchase of a new apartment in Dorćol, near the Faculty of Physics. In 1989, I had another daughter, Milica, an advanced and cheerful girl, who was always in a mood for laughter and teasing. I also bought a small motor boat for driving and fishing. I kept it in the "Dorćol" marina, at the mouth, opposite the Great War Island. A large old barge was located there, on which the headquarters of the DMSR (Society for Motor Nautics and Water Sports) was located. It was an ideal place to hang out with long-time fisherman, fry fish, have a cold beer and casually recount real and fictional fisherman incidents and misadventures. I fished in tandem with Zoran, known as Ćora, who had fisherman nets, bump, and black nets. There were also catches, I took out, with great excitement, several catfish of 10-12 kilos, and we regularly had white fish for frying, fish soup and a feast on the barge.

Of course, as everywhere else in the city, various social events were searched and suggestions were given for political solutions and qualifications for current actors of political and social life. Usually, in the beginning, the opinions agreed or only slightly differed, so that every discussion would regularly end with exclusivity and raised tones. The more active, mostly younger, participants accused the older

"communists" of the ruin of the state and society, and the older and more obstinate ones usually ended with a caustic threat, uttered by Uncle Steve, the bearded man, barber: "We built this society for 40 years, so you will need at least 60 to change it." There was something true, but also sinister in those words, as if they foreshadowed the events that were unfolding from the coming inevitable future.

Tensions in society grew gradually but unstoppably. A brief overview of the events, randomly selected on the Internet, can be found at the following: *https://vreme.com/vreme/1987-trenutak-istine-dragise-pavlovica*/. The party and the state were disintegrating, society was disintegrating, and hatred was painted in national and religious colors. Every other sentence in the media was propaganda, often more fierce than Orwell's in "1984". The cult of personality and the horrors of totalitarian society have also been overcome. Preparations were being made for war. I had no intention of writing about this, but it turned out to be unavoidable. One cannot stand aside and talk about science and the university, since those spheres were also involved in social events. Moreover, according to many indicators, they were largely the initiators and inspirers of events, starting with the Serbian Academy of Sciences and Arts and the famous draft Memorandum from 1986. Due to busyness and involvement in other content, I did not deal with these topics at one time, but I recently read the text of the historian Prof. Olivera Milosavljević, who analytically illuminates this period of our history (*http://www.yuhistorija.com/serbian/doc/Upotreba%20autoriteta%20nauke%20-%20Olivera%20Milosavljevic.pdf)* from 1986 to 1992.

I will not deal with the mentioned analyzes here either, but I will list some examples that I could not avoid and which affected me personally, or my immediate environment.

New parties were included in the media spheres (SPO of Vuk Drašković, SNO of Mirko Jović, SRS of Šešelj, Nikolić and Vučić and other smaller parties under the leadership of security forces and structures...) and their obscure leaders, who introduced additional confusion and fooled the enlightened people with renewed ideas Serbianness, humanity and heroism. Somehow, from this point of view, the film "1984" seemed to me to be a pale picture of reality and a naive version of "sleeping" totalitarianism. I will not write here about the events in Croatia, Krajina and Bosnia and Herzegovina because I did not have any direct contacts with those regions and as such they remain out of the scope of this text.

Inflation in Serbia started to grow and then went wild. In 1994, hyperinflation reached a daily rate of 62% (for 1 hour it was 2.3%). I remember the day when we received the so-called personal income. We all literally ran to the wild exchange offices, the closest ones were on Zeleni Venac and in Čumićevo sokače. If the foreign currency, the marks (DM), disappears in one of these two places, by the time we get to the other, it has lost a lot of value. On one occasion, I did not manage to exchange money, so I went to the supermarket, and with my salary I bought bread, oil, milk, flour and a kilo of apples for the children. The largest banknote printed at that time was the one of 500 billion dinars, that is, with eleven zeros. The people fought back, as they knew and knew how. Even then, it meant a lot to me to occasionally go and work

in Belgium, and also my relatives from the countryside, who helped as much as it was possible.

With the formation of the JUL (Yugoslav United Left) movement in 1994 under the leadership of Mirjana Marković, Belgrade universities and other universities were directly drawn into the vortex of politics. The culmination was reached with the adoption of the new University Law in 1998. Wars were already fought on the territory of the former Yugoslavia. Fierce discussions were held in the meeting rooms, with the presentation of new conquered or imagined state entities. There were reports that the same climate prevailed in other areas, as well as in other former republics of Yugoslavia. The war was not officially declared, but our volunteers, soldiers and reservists went to the battlefields in various areas of the former country. From Kalemegdan, I saw on the highway, near the Sava center, a long column of millitary tanks commanded by, as I later saw on the TV news, Major Veselin Šljivančanin. In a fraction of a second, I was frozen, and then I realized that the column headed towards Vukovar, where the bloody battles took place.

I heard from assistant Goran that my doctoral student Vića, as a military reservist with a schedule, was taken to military positions in Srem. We had no news of him for several months. And then one Monday he stopped by the faculty to see us. He didn't stay long and didn't talk much. It was seen on him that he was surviving what we objectively could not even imagine. The conditions on the field were difficult, but he was not a participant in the fighting. They held their position and guarded the border with Croatia according to schedule. Granted, they would occasionally hear gunfire.

After that, I didn't see him for a while. He received his doctorate in 1999. In November of the same year, he went to postdoctoral studies at Washington University in St. Louis, USA, where he then got a job and settled down with his family.

A state of war was felt in Belgrade. The University Act was strictly enforced. Fear and repression reigned. The successors of the ruling structures did their planned work. Physicist Jagoš Purić was appointed rector. He rarely came to the university, but I saw him being driven in a Mercedes around the surrounding streets of Student Square and from the party headquarters to the rector's office. He also had a bodyguard assigned to him, probably for security reasons. Once, a bodyguard stopped by the faculty secretariat with him. Together with the secretary at the time, I saw that he was carrying a gun under his jacket, tucked into his belt.

A small group of professors and researchers at the University of Belgrade formed, as a reaction to the repressive law, the association UPI (Association of Professors and Researchers). The Otpor, student movement, was also formed, as well as a slightly wider circle of younger activists of the UOOD (University Committee for the Defense of Democracy), which was represented by Goran Milićević, and I was his informal deputy. On my own initiative, I launched the website " *https://univerzetet98.tripod.com/*:

NOT TO BE FORGOTTEN

Consequences of the application of the University Law from 1998 at the University of Belgrade

"In the previous period, the University of Belgrade lived through its most stormy years. Especially after the passing of the Law of the University from 1998, there was a series of dramatic events that had profound consequences on the entire academic community. Ineligible professors and associates were fired, and people without the appropriate qualifications and without the necessary procedures were appointed to their positions. We are excluded from the European Rectors' Conference. Students were repeatedly beaten in the incidents at the faculties (Philology, Philosophy, Architecture...) as well as on the streets and at protest rallies. Immorality, corruption and rot prevailed, which was the intention of the proponents of this Law".

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The website had a role to play, keeping the flame of resistance alive and helping preserve the memory and authentic record of a time. The epilogue of the event is listed on a separate link at the end of the site, and we will return to it later.

It was boiling in Kosovo and Metohija. Some in formations were leaked, and some were available on the Internet and from foreign media. Slovenia was the first to separate from Yugoslavia, because it was ethnically homogeneous. In Croatia, Serbian Krajina was formed, as well as Slavonia, Baranja and Western Srem, but Croatia was soon recognized by the so-called Western countries. In Bosnia and Herzegovina, the number ratios of the three ethical communities (Serbian, Croatian and Bosnian) were equal and led to serious armed conflicts, with numerous victims.

In the early 1990s, a certain Zlatko Lagundžija from Bosanski Brod came to Obrenovac and asked where my brother lived. It was a younger man and he had information that we own the scaffolding, that is, dereglija and a motor boat, for transporting passengers across the river. It was the same scaffolding with which we worked a decade earlier to transport passengers on Ada Ciganlija, and he also heard about it through his compatriots who had previously escaped down the Sava to Serbia. The bridge connecting Slavonski Brod and Bosanski Brod was damaged earlier in combat operations, so they asked to buy a scaffolding for transporting people and goods, because they had to live, they had to cross the river, because of work, because of the connection between people, explained Zlatko. Some new people came, a new time came, but everything that connected people from the two sides of the Sava could not be erased. We easily agreed on the price of the facilities. We had to legalize the sale and draw up a sales contract, because the land was divided and all parties were asking for papers, such were the times. We signed and certified the contract in the municipality of Stari Grad. We saw off Zlatko and the friend who came with him and they went upstream of the Sava. Six months later, we heard from a passer-by from Bosanski Brod that the dereglija was hit by a shell in an action and sunk. It was sad, but luckily no one was hurt.

Some kind of solution for Bosnia and Herzegovina came about thanks to the great pressure and efforts of the Western countries, with the adoption of the Dayton Peace Agreement in 1995. In Kosovo and Metohija, however, the Albanian population was numerically superior and a compromise, non-

violent solution could not be found. It turned out that, officially, none of the nations, including Montenegrins and Macedonians, wanted to remain in the union with Serbia. A logical conclusion emerges that the roots of disagreements and conflicts come from the authorities in Serbia. There were also additional pledges on Kosovo and Metohija, the legality and possibility of maintaining the government's monopoly was called into question. The conclusion was imposed that the government in Serbia did not see the possibility of its survival and did not want to accept Albanians on its territory. They wanted to keep the territory, but they didn't know what to do with their million voters. For decades, they lived next to each other, but then there was no choice. And now, after the fall of the Berlin Wall, those questions are also open.

Was deportation the solution?

The government in Serbia had all the levers of power in its hands, the army, the police, paramilitary formations, the media, and the entire financial and material resources of the country. The ruling group of powerful people has become hostage to their disproportionate power. The only thing was they didn't have the brains to decide what to do with them. They believed that they could do anything and that they had to preserve power at any cost. They also believed that no one from outside could interfere. The people lived in unprecedented fear and terror. In addition to other declared enemies, it also became its own people. The leading media in Serbia constantly satanized foreign media and domestic opposition actors. In October 1998, at the request of the then Minister of Information, Aleksandar Vučić, the Law on Public Information was adopted, remembered for the

draconian punishments for journalists whose writing contradicted Slobodan Milošević's policies, and the editorial offices of independent media were shut down. In addition, people were killed (one of the founders and editors of the independent newspapers, Slavko Ćuruvija, was killed on April 11, 1999), without the perpetrators and the killers ever being discovered. As a reaction to such a situation, there were warnings from world leaders and foreign diplomacy. Domestic propaganda ignored or rejected them. All kinds of news were leaking about crimes on all sides. All this was done because of "state and national interests".

As an external response to the moves made by the government in Serbia, on March 24, 1999, NATO bombardment began, first of military and then of other targets in FR Yugoslavia.

In the night between April 20 and 21 of that year, sometime after 3 a.m., on the twenty-eighth day of the NATO aggression against the FRY, the Business Center "Ušće", popularly known as the "CK" building, was bombed, the former headquarters of the Central Committee of the Communist Party of Yugoslavia and Serbia. I was woken up first by the engines of a plane that flew over my building on Dorćol from the west in the direction of Kalemegdan and New Belgrade. Then explosions were heard, and then extremely powerful engine work as the plane suddenly moved away. I understood exactly from the operation of the engine that an air-to-ground bomb attack had been carried out. And then everything fell silent, the usual explosions of anti-aircraft missiles were heard only afterwards. As far as I remember, it was the worst night for Belgrade. In the early

morning of April 21, a rather strong earthquake occurred. It drove us out of our apartments and shelters onto the streets.

The next day I took my younger daughter to Kalemegdan, to ride bikes. We stopped at the Sava terrace from where the damaged building of the Central Committee could be seen. We were used to such scenes. Night bombings of oil refinery plants and industrial facilities in the vicinity of Pančevo happened very often, which could be heard and seen from the terrace of our apartment. Sometimes the explosions were very strong, with dense and long-lasting emissions of toxic gases, so that we could not open the windows for days.

The bombing of Serbia lasted until June 10, 1999, a total of 78 days. Serbia was forced to withdraw all its armed military and police forces from the territory of Kosovo and Metohija. That outcome was known from the very beginning, the facts are the facts. The World leaders may be unfer and unjust. But what gave the current government the right, motive and audacity to expose the entire nation to bombing in hopeless conditions, for the sake of futile attempts to stay in power as long as possible? And why did the people accept all that? Perhaps the best answer to these two questions, at one time and in the same sentence, was given by Nobel laureate Ivo Andrić, with the following thought:

"Long-term slavery and bad administration can so confuse and distort the understanding of a people that common sense and true judgment weaken and weaken it, until it is completely distorted. Such a deranged people can no longer distinguish not only good from evil, but also their own benefit from obvious harm." (Ivo Andrić).

The opposition coalition Alliance for Change organized several demonstrations against the regime of Slobodan Milosevic starting in August 1999. In October, there was an assassination attempt on the opposition politician Vuk Drašković on Ibarska Magistrala, in which four people lost their lives. The Democratic Opposition of Serbia (DOS) coalition was formed at the beginning of 2000.

I followed the events and was to some extent an active participant. I participated in all the protests. I was not in any party, but within UOOD, I joined the Alliance for Change with Goran Milićević, as a collective member. I was closest to Vladan Batić, the president of the Christian Democratic Party of Serbia, because he was from Obrenovac, for a while we went to Obrenovac high school together, and in Belgrade I lived near the DHSS headquarters, in Zmaja od Noćaja near Kalemegdan. Since I worked at PMF, I often stopped by Vladan's place. I also attended press conferences, and went to rallies in Smederevo, Šabac, Požarevac and Obrenovac. I also attended the meetings of the presidency of the Association several times. In the party, I met Milutin Komanović, a retired police official Sveta Djurdjevic, Svetislav Basara, and others. Basara was an interesting character; he mainly used the party infrastructure to reprint and prints his literary works. Later, he also scratched for a diplomatic post in Cyprus. I did not appreciate him much as a writer, and especially not as the son-in-law of Brana Crnčević.

In Knez Mihailova Street, I met Tomislav Jeremic - Tomica, a classmate in high school, in those days. Now he was the secretary of the Serbian Restoration Movement of Vuk Drašković. We had a short chat and he invited me to come to

SPO for a drink, the next day at noon. We refreshed our memories of school and friends, he was glad that I stopped by and I expressed my praise for his position. The party premises were in a good location, luxuriously furnished, with a secretary. Vuk was not there, so we talked openly. Of course, at that time the main topic was politics. I told him that I am not politically engaged, but that I follow events. He talked about the party and the influence they have. I asked him if Vuk plans to run for president, I emphasized that he has a chance to win. He agreed, but admitted to me that there was a lot of pressure, from the top, to give up. In the middle of the conversation, Milan Božić from JUL appeared in the corridor. He said goodbye to Tomica and smiled slyly when he recognized me, because until then he had only seen me at the university. He didn't stay long; he had an appointment with Milan Komnenić. Tomica noticed that I was surprised by this meeting, so he said questioningly - do you know this JUL member? Yes, I said, he is also working on PMF, only he is in Mathematics, and I am in Physics. He is strong politically, said Tomica, in politics one must cooperate. "Of course", I agreed. "And you say Vuk will not participate in the elections"? No, he said, they are now negotiating a new candidate, who will lose more easily against Milosevic. I didn't ask who it might be, so it wouldn't sound suspicious. Tomica seemed to be reading my mind, he only said: DSS (Koštunica). Vladan Batić had already heard that Vuk was scared after the assassination attempt on him, or he was convinced in another way, but it was not known who the other candidate was. After the meeting I went straight to DHSS. Vladan was there; I went to him and said only:

Koštunica. He dialed Djindjic and said: Boss, Voja... That's right. And what can you be sure of here today? That's it for now, see you.

In June, another attempt was made to kill Vuk Drašković, and not long after that he left DOS. Before the federal elections in 2000, it was speculated that Ivan Stambolić could run as an opponent of the united opposition for president of the FRY, and in August of that year he was kidnapped and killed by members of the Special Operations Unit, SOJ.

Direct elections for the president of the Federal Republic of Yugoslavia were held only once, on September 24, 2000, together with regular elections for the Assembly of the FRY and elections for the local self-government of Serbia.

Vojislav Koštunica, the candidate of the Democratic Opposition of Serbia won the first round with 50.24% of the votes, which was the first victory of the opposition in the elections since the introduction of multi-party systems. CeSID stated in its report that the illegal recounting of the election results was prevented solely due to pressure from the mass protests that followed and the concession of institutions such as the Federal Constitutional Court and the Federal Constitutional Commission. Tomislav Nikolić, SRS candidate, Vojislav Mihailović from SPO and Miodrag Vidojković at the proposal of the Affirmative Party also took part in the elections.

Slobodan Milošević did not want to recognize these results, he asked for a second round to be held, but all other participants and observers accepted the victory. At the suggestion of Đjinđić, DOS supported the organization of a

general strike throughout Serbia and announced a protest in Belgrade for October 5. The response was massive; the columns made their way to Belgrade and the atmosphere became literally incendiary. I went with a group from Dorćol, Francuska street and then in front of Dom omladine. I met many known people, determination and resolve to win freedom at any cost was visible on all faces. Around 15:30, a group of people entered the Parliament through a window. The police managed to disperse some of the people in front of the Assembly with a large amount of tear gas, but new groups entered the building and the police retreated. Thick black smoke appeared on the right wing of the building, windows were broken and several police vehicles behind the Assembly were demolished. After a few hours, the police officers asked to speak with the DOS, laid down their weapons and joined the protesters. Groups of citizens also went to the RTS building. Excavator Joe came to the rescue and the entrance was won. The most persistent were members of the Red Berets of the JSO. Despite the agreement to stop the riots, the armed men drove their vehicles through the streets full of citizens and threw tear gas all over Tasmajdan. I was temporarily cornered in a yard across from the RTS, and then I ran into a large concentration of tear gas in front of the Church of St. Marko. Only in the evening did the atmosphere calm a bit down. People did not want to disperse. All night long, they were on duty in front of the City Assembly, where negotiations between the DOS and the overthrown authorities on the formation of the government's crisis headquarters were being held. I was exhausted, I don't remember how long I stayed and when I went home.

The newly elected president of the FRY, Vojislav Koštunica, addressed the citizens from the terrace of the Belgrade City Assembly, and then through RTS. On October 6, Slobodan Milošević addressed the nation on television and officially admitted defeat in the presidential elections. The following day, Koštunica took the presidential oath before the deputies of the Federal Assembly as the first democratically elected president of Yugoslavia. A provisional government was also formed, which had the task of governing Serbia until the organization of the elections for deputies of the Republic of Serbia planned for December 2000.

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The removal of Milošević brought a new impetus to the majority of citizens for the organization of the state on democratic principles and the introduction of political pluralism at all levels. However, this was done with great difficulty, given decades of opportunism, retrograde heritage and habits. The spirit of change was felt, tension and constant social tensions subsided, and pre-election rallies brought optimism.

UOOD, as a former member of the Alliance for Change, remained an informal member of DOS. We wanted to give as the university community a contribution to the upcoming changes. I attended one of the meetings where the proposals for the conditional division of personnel and departments in the new government were recorded. I was among the first to speak and proudly stated that UOOD had no demands on those issues, but that it was ready to help in the organization of teaching and science. The comment of several members of some movements and associations was: "then why did you come here, when you are not looking for anything?" It was seen that ideas about the division of power and functions were still dominant.

On December 23, 2000, extraordinary elections were held for the Assembly of Serbia. DOS won 176 parliamentary seats

(out of 250) and had a two-thirds majority in the assembly. DS and DSS each had 45 mandates, while the rest went to the remaining parties (G17+, SD, GSS, DHSS, NS, PDS, LSV, SVM, DA, DC, ND, SDU, NSS, LS, SDP). The names of leaders and ideologies were not mentioned here, but at first glance it was clear that there was everything and anything, from former military personnel, security structures, prominent representatives of the previous government, what the people would say - from thread and rope. It wasn't hard to imagine how it would work. But I guess it had to be like that. As Steva brica and Mika Francuz said, it will take a long time to dismantle the old regime here.

At the end of January 2001, the Government of Serbia was formed headed by Zoran Đinđić, the leader of the Democratic Party. This government made a number of radical economic and social changes. Privatization of companies has begun, as well as the implementation of pro-European and pro-democratic changes.

On April 1, former Yugoslav President Slobodan Milošević was arrested and on June 28 he was extradited to the Hague Tribunal for war crimes. At the beginning of August, a former employee of the State Security Service of Serbia, Momir Gavrilović, was killed in Belgrade. The DSS accused the Government of Serbia of being involved in this murder. Two weeks later, the DSS left the republican government and the ruling coalition, accusing them of being linked to organized crime, but without valid evidence. Relations between DOS and DSS became complicated, and the old forces began to consolidate. No lustration was carried out, not even attempted.

Without going into the other departments, I will give a brief comment on the work of the Ministries of Education and Science. The Minister of Education was Gašo Knežević, and one of the assistants was Srbijanka Turajlić. At the meeting with the UPI delegation, she stated that she herself is aware that the amendments to the Law on Universities are not enough, that the idea of lustration in education has been compromised, and that she herself is not satisfied with the changes. The reasons, as she explained, are opposing views and the impossibility of reaching a consensus on changes among the DOS members themselves. I was the most energetic in the discussion. I thought that in such an atmosphere there was no point in seeking consensus. Let her propose reasoned solutions and if they are not accepted, she should resign and go public. None of that was done, nor was it attempted.

Earlier, I spoke about the creation of the website "Not to be forgotten", dedicated to events at the University of Belgrade in connection with the Law on the University from 1998 and its implementation. I thought that after the October 5th changes in Serbia, that part of the past remained for learning, but it was not so. For this reason, and especially because of the obstruction of lustration, as a member of the new Council in the convocation of 2001, I proposed to the BU Council to establish the Court of Honor of the University of Belgrade. With the support of the new rector Marija Bogdanović and enthusiasts from UPI, the proposal was accepted and the adoption of the work regulations and the Court's Code of Ethics began. It was decided that the court will have 7 members, one representative of five existing scientific

groups, one delegate of the Government of Serbia and one delegate of students. In the first convocation, the following were elected: prof. Dr. Dragoljub Belić, Faculty of Physics, president, prof. Dr. Milić Milovanović, Faculty of Economics, deputy president, prof. Dr. Slobodan Apostolski, Faculty of Medicine, prof. Dr. Aleksandar Duduković, Faculty of Technology, prof. Mihailo Grbić, Ph.D., Faculty of Forestry, Zoran Ivošević, Ph.D., judge, Government delegate in the BU Council and Ognjen Pantelić, student, Faculty of Organizational Sciences, University of Belgrade

In order to draft the proposal for the Code of Ethics, I made a comparative analysis of several examples that existed in the most developed countries and I chose, due to the content and wording, the Model Code of the Association of American Universities, which was adopted by 60 universities in the USA and 2 from Canada. In order to avoid illegal authorship, I requested and received official permission from the AAU to use their model.

The Council adopted and published the Code, and cases began to arrive. Several university professors, as well as secondary school professors, came forward and spoke highly of this news. I remember a letter from a retired professor from Aleksinac, who sent a long letter, explaining his experiences from college and expressing his joy at seeing the care and attention given to morality. He typed the letter on a typewriter with well-worn keys, and signed it with an old-fashioned, so-called with an ink pen, which could be seen by the slightly spilled mark of the moistened tip of the pen.

I had the intention that, among the first activities, we would determine the Communication on the consequences of the application of the Law on the University from 1998. I presented that at the session of the Court of Honor, which was accepted by the majority of votes, with the reservation of Judge Ivošević. Judge Ivošević announced his resignation and did not want to participate in the work on this topic. I didn't fully understand why he behaved like that, but he still remained a member. We worked long and hard on the Communication, because the issue was extensive and sensitive. When it was finished, it was adopted by a majority of votes and published at the Council and in the University Gazette.[2]

By the end of the mandate, we had several cases under consideration, in which we tried our best to comply with the principles of the Code of Ethics. We had reports from the Faculty of Forestry, Teacher Training and Biology, where there were violations of the principles of the code either among colleagues, or between management and employees. In any case, there were reasons for establishing the Court of Honor. There were also criticisms of the existence of this body, as well as attempts to discredit it by submitting fake applications and cases.

The court worked until the next elections of the University's bodies, and then there was turbulence that also affected the University. The rector was replaced. Among other things, the

[2] After the murder of Zoran Đinđić, I was invited by the judge of the First Municipal Court in Belgrade, Raša Janković, to distance myself from the statement in question, which I categorically refused.

Court of Honor was renamed the Committee for Professional Ethics.

It was the same with science as with education. Dragan Domazet, who was not sufficiently familiar with the state, relationships and clans in Serbian science, was elected as minister. For the collegium, he chose people from Vinča who, until then, were active in Serbian science. Each DOS party put in its own person, and no one cared about scientific policy, so the existing project competitions were gradually extinguished. We organized a meeting of UPI and UOOD representatives with Domazet and his assistant, but no progress was made. For more than a year, there was no official website of MNTR (Ministry of Science and Technological Development), so everything was shrouded in secrecy. I decided to start a new alternative website "Science Yes or No!" with a group of younger colleagues from UPI: (*nauka2001.tripod.com*) which dealt with issues of science and technology. It published a large number of critically oriented articles with constructive and well-argued proposals for where and how to proceed. The government's reaction was - "Don't make waves".

Alternative website of the Ministry of Science and technological development

It was created with the good intention of making the work of the Ministry as public as possible, for all scientists and collaborators who are interested. That, in the absence of an official Web-presentation, mutual communication and information exchange should be achieved and the work of the Ministry should be constructively influenced. Anyone

interested could send their contributions to the editorial office. All serious, constructive and signed contributions are included on this website. (Visit the site, some parts is in English).

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Dozens of contributions on this site, in themselves, show the justification of the introduction of the site and the need for public access to the work of the Ministry. Many criticisms were given, but also useful and constructive suggestions for the arrangement of this area. The most criticism was directed at the construction of the cyclotron Vinci in Vinča, which was the "black hole" (or bottomless hole) of Serbian science in the last years of the last century.

At that time I was going to Belgium and doing an experiment with an ion beam produced at the IBA cyclotron. The company IBA (Ion Beam Accelerators) was a daughter company of UCL, which was then the world leader in that field. They had a huge hall, like an airplane hangar, in which they serially produced cyclotrons for nuclear medicine, as the one in Vinci was supposed to be. I knew Olivier Van Der Borght, director of IBA, whom I officially asked for an offer, i.e. the price. His answer, translated in comparison with the Vinča case, was that, just for the funds used up to that point, we could have had three cyclotrons. Despite these facts, the Ministry continued funding, the installation never worked and no one were ever held accountable for it.

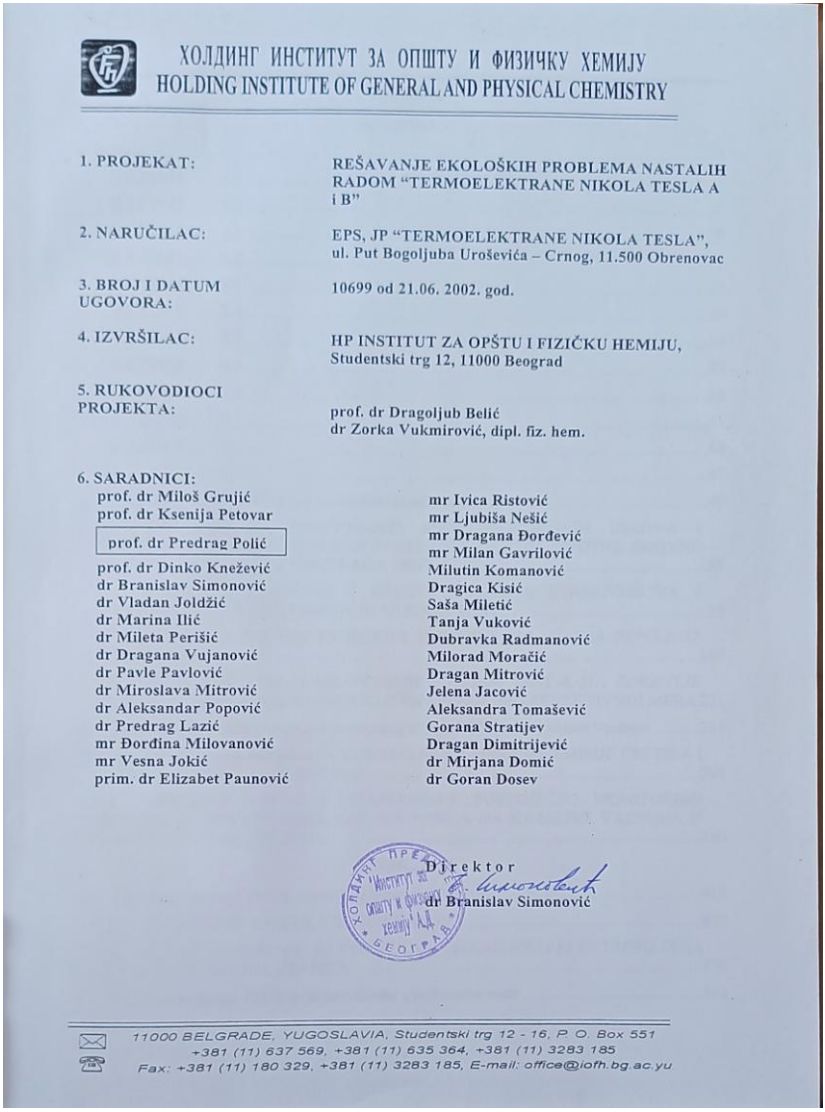
However, there were also other examples. I mentioned earlier that at the DHSS headquarters I met Milutin Komanović, a resident of Belgrade, who was originally from Obrenovac,

from the settlement of Grabovac, in the immediate vicinity of TENT, the Nikola Tesla A Power Plant. He told me that the inhabitants of the surrounding settlements, and Obrenovac, are often exposed to extremely harmful effects of air, water and soil pollution due to the operation of the thermal power plant in inadequate conditions, i.e. outside the designed operating mode. In short, the emission of harmful gases, sulfur dioxide and nitrogen oxides was higher than permitted, and the emission of powdery substances and smoke was several times higher than permitted. During periods of windy weather, clouds of smoke and dust were raised from the ash dumps; the surrounding watercourses contained high concentrations of pollution and toxic substances. As a consequence of all this, the land and agricultural products were threatened. I talked several times about it with experts, Dr. Zorka Vukmirović and Dr. Branislav Simonović - Sima, director of the Institute for General and Physical Chemistry, located on the 5th floor of the PMF in Belgrade, directly above my research laboratory at the Faculty of Physics. Gradually, that circle of people expanded and we decided to take comprehensive steps to assess the extent of pollution and the necessary measures to solve the existing problems. That was the job for the director and experts of TENT, including EPS, the Ministry of Energy and the Ministry of the Environment. However, due to the bizarre policy and inadequate organization of management in the previous period, most of them did not function adequately, so the mentioned problems arose. In cooperation with the new assistant director, Nebojša Ćeran, we launched a broad action on all parts of the system and put together a team that

numbered over 30 PhDs and other experts from relevant fields. In the first venture, we analyzed and recorded the existing situation, and then we formed teams to solve certain problems. Due to the complexity of the problem and the outdated technology, we launched a large, comprehensive project to revitalize the system. The director and competent authorities were very understanding and gave us support. The results of the project were written in a study on over 860 pages and were handed over to the EPS clients.

I co-managed the entire project together with Dr. Zorka Vukmirović and managed the specific topic 3.2. "Suggested solution for increasing the efficiency of electrostatic precipitators and reducing particle emissions". It was a new job for me, but the procedure was based on the physical capture of electrons on the emitted particles and their separation by high voltage on the collector electrodes, respecting Deutsch's formula. I have obtained the available emission measurement results. I contacted the company "Lurgi" from Germany, which was the constructor of the filters. I also established cooperation with a new, more modern company, "Environmental Elements" (EE) from the UK, specialized in the upgrading of electrostatic precipitators. The director of this company, Doug Cormack, and the chief constructor of EE, Ian Crawford, were coming to Belgrade on that occasion and I took them to TENT, to a meeting with the engineers and management there. They requested and received the existing documentation. A tender was soon announced for the reconstruction of the filters for TENT A, I bought the documentation and sent it to the EE

Company. From contacts with them, I myself learned a lot about electrofilters.



ХОЛДИНГ ИНСТИТУТ ЗА ОПШТУ И ФИЗИЧКУ ХЕМИЈУ
HOLDING INSTITUTE OF GENERAL AND PHYSICAL CHEMISTRY

1. PROJEKAT:	REŠAVANJE EKOLOŠKIH PROBLEMA NASTALIH RADOM "TERMOELEKTRANE NIKOLA TESLA A i B"
2. NARUČILAC:	EPS, JP "TERMOELEKTRANE NIKOLA TESLA", ul. Put Bogoljuba Uroševića – Crnog, 11.500 Obrenovac
3. BROJ I DATUM UGOVORA:	10699 od 21.06. 2002. god.
4. IZVRŠILAC:	HP INSTITUT ZA OPŠTU I FIZIČKU HEMIJU, Studentski trg 12, 11000 Beograd
5. RUKOVODIOCI PROJEKTA:	prof. dr Dragoljub Belić dr Zorka Vukmirović, dipl. fiz. hem.

6. SARADNICI:

prof. dr Miloš Grujić
prof. dr Ksenija Petovar
prof. dr Predrag Polić
prof. dr Dinko Knežević
dr Branislav Simonović
dr Vladan Joldžić
dr Marina Ilić
dr Mileta Perišić
dr Dragana Vujanović
dr Pavle Pavlović
dr Miroslava Mitrović
dr Aleksandar Popović
dr Predrag Lazić
mr Đorđina Milovanović
mr Vesna Jokić
prim. dr Elizabet Paunović

mr Ivica Ristović
mr Ljubiša Nešić
mr Dragana Đorđević
mr Milan Gavrilović
Milutin Komanović
Dragica Kisić
Saša Miletić
Tanja Vuković
Dubravka Radmanović
Milorad Moračić
Dragan Mitrović
Jelena Jacović
Aleksandra Tomašević
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The tender was not pre-agreed, the job was won by the daughter company of Lurgi from Poland due to the best offered conditions. There I concluded that for the future of system maintenance, it would be useful to follow the example of Poland and establish a joint venture for the maintenance of electrofilters, which was also one of my proposals for solving environmental problems related to all thermal power plants of EPS. Then the reconstruction of the filters on blocks 1 and 2 began. Funds had to be secured for other works, but it was certainly important that the work started.

Project Program: Solving environmental problems caused by"The Thermal power plant Nikola Tesla A and B"

1. Reducing the impact of TENTA on the local community

1.1. A proposal for the improvement of socio-economic conditions and the implementation of legal norms in the field of environmental protection based on the principles of the sustainability of TENT's work

1.2. Systematic monitoring of the harmful effects of TENT on the health of workers and the local population and the proposal of preventive measures

2. Continuous emission measurement and monitoring of TENT's impact on air quality

2.1. Proposal for a solution for continuous measurement of particle and gas emissions from TENT Obrenovac

2.2. Proposal for a new and improvement of the existing monitoring system

for determining the impact of TENT on air quality in Obrenovac and Belgrade
3. Reduction of the emission of harmful substances in flue gases
3.1. Reduction of emissions of harmful gases
3.2. Proposal for a solution to increase the efficiency of the electrostatic precipitator and reduce particle emissions
4. Reducing the impact of TENT on surface and underground water
4.1. Proposal and analysis of solutions for the treatment and management of TENT's waste water
4.2. Proposal for a new and improvement of the existing monitoring system for determining the impact of TENT on surface and underground waters in the area
5. Reducing the impact of de-ashing, de-slagging and depositing on the environment
5.1. Analysis of the situation and definition of the program of measures and procedures for the technical, technological and ecological improvement of the situation at the ash and slag landfills TENT-A and B
5.2. Analysis of possible solutions for the reconstruction of the TENT ash and slag transport system
5.3. Proposal of possible solutions for biological reclamation of TENT's ash and slag landfill
5.4. Application of fly ash for the production of "Low-energy" building materials.

Proposed solutions:

At the end of the study, a recapitulation of the basic proposals was carried out, which are in accordance with the existing legislation and are planned for implementation at the facilities. The dynamics and deadlines for the execution of the works, the expected effects, the funds required for implementation, as well as the total planned funds are listed.

Due to the volume of topics and positions, I will not list the details here; I will only mention that all the proposals are in the submitted documentation, which exists with the project orderer, the project deliverer and EPS.

The study was completed in June 2003, is written in two volumes, total of 868 pages and has a summary in English written on 50 pages. A copy of the study can be found in the library of the Faculty of Physics on Studentski trg, in Belgrade.

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In September 2002, elections for the president of Serbia were held. The candidate of the ruling DOS was Miroljub Labus, and the candidate of the then largest opposition party DSS was Vojislav Koštunica. Koštunica received more votes in the second round, but was not elected due to an insufficient number of voters.

In February 2003, the Federal Republic of Yugoslavia was abolished, and the State Union of Serbia and Montenegro was proclaimed. Thus, Vojislav Koštunica lost his previous state function. His DSS party went into opposition, and DOS consolidated its power.

However, on March 12, 2003, the first democratically elected Prime Minister of Serbia and the leader of the ruling coalition, Zoran Djindjic, was assassinated in front of the Serbian Government building. It was a big shock for the people of Serbia, who had just begun to hope and believe in a better future.

I was desperate. I myself hoped that in the new century I would live in a normal, orderly state, as I lived in before and abroad, without conflicts, without tensions, without fear. Those were just wishes and of several hundred thousand citizens who silently, with sadness, saw off Zoran Đinđić.

Two days before the assassination, I met Baro; neighbor, on the street, which was something like a local secikesa/pocket-controller for street vendors at improvised stalls on upper Dorćol. He knew everyone, shared news with everyone and spread "confidential" information about current events, especially politics. He surprised me several times by announcing confidential information and events that actually followed, which was not unexpected in the conditions in which we lived. He only said to me: "Expect in a few days, tomorrow or the day after tomorrow, big things will happen, big changes. May God help us"? I opened my mouth to ask him what kind, he just waved his hand, said that he must not tell me anything more, and hurriedly continued on his way. Under the circumstances, after the assassination, my thoughts revolved around the question of whether it was connected with the announcement of the assassination. Doubts grew, and somehow mechanically I dialed the phone of Sveta Djurdjevic, a retired security guard from DHSS, since Batic could not be reached in the current situation. Sveta was immediately reinstated; he was in the Ministry of Police. I tried to convey Baro's words to him. Calming me down, he told me not to spread the story and invited me to come to the ministry. Moreover, he sent an official patrol car to pick me up. The streets were empty; I felt a chill from everything. Sveta received me immediately and offered me coffee. I told him about the meeting, he knew Baro: "That's the Montenegrin Barović from Dorćol." He's messing around all over the place and talking all kinds of things, but he couldn't have known about this one, I'll check what he was thinking. In any case, it's over now, nothing can be corrected, and the

police will shed light on all the circumstances" (it sounded familiar). I never fully believed Sveta. I was particularly disturbed when I found out that he had returned to the service, no less than with Dusan Mihailović. Of all the leading members of the DOS, I had the least confidence in him. I didn't know him personally, but I learned to judge a man by his physiognomy and behavior. I remembered the words of an acquaintance: "once a DB, always a DB". Whether Sveta was assigned to the DHSS, or whether he came there out of conviction, will remain a permanent enigma for me.

The murder of Djindjic was a shock, regardless of the existing speculations and even open verbal threats, which came both from radicals and from other actors of the Serbian "establishment" and underground. I met Zoran a couple of times. He inspired confidence and was very persuasive and courageous. He knew how to take risks and take responsibility. One thing bothered me since he was already elected as the Prime Minister of Serbia. He trusted people too much and became careless. As if it was all over, he played a trust game with the criminals instead of stepping up precautions. Information leaked from the Government that Dusan Mihailovic could not (or did not want to) provide him with police protection. The army was controlled by Koštunica, as the president of the FRY. The special units were better equipped and organized than the police, and everywhere there were influential forces from the previous government. Djindjic had to try to impose a state of emergency, even though he had no support for that either. The mistake was the attempt to use democratic instruments to

oppose the bullies of the old regime. That attempt was doomed to fail, and it did. I was disappointed and angry, because he didn't even try to oppose and protect himself more strongly. He paid dearly for it, as did all of us along with him, well, unknowingly, even those who were against him. Unfortunately, there still does not seem to be a successful mechanism for a peaceful transition from dictatorship to democracy.

Zoran Živković, former deputy president of the DS and federal police minister, was elected as the new prime minister. During that 2003 year, his cabinet was attacked and challenged a lot. Accusations about affairs continued, so that the opposition parties, the DSS, the Serbian Radical Party, and the Socialist Party of Serbia began to grow stronger. In October, the Assembly of Serbia started a debate on the vote of no confidence in the Government, which was initiated by the opposition. In the middle of that discussion, c. d. of the President of the Republic, Nataša Micić, dissolved the parliament and announced extraordinary parliamentary elections for December 28.

On this occasion, the Democratic Party decided to go to the elections independently, and nominated Boris Tadić, the vice-president of the party, as the candidate. That was the end of DOS, because the parties from that coalition did not jointly participate in the elections. The consequence of this decision was that in those elections, the Serbian Radical Party won the most parliamentary seats, 82. Kostunica's DSS won 53, DS 37, G17 plus 34, and the SPS and the coalition Serbian Renewal Movement - New Serbia 22 seats each.

These results hinted at profound changes in the composition of the government in the following period, as well as the following destructive changes in the leadership of the DS and finally the departure of Tadić from the party and the formation of the SDS, which all led to changes in the power relationship between the democratic forces and the forces of the old regime, in favor of the latter. Who influenced all the relations of these forces? Was there a "Grand Lodge", I don't mean the Freemasons, which in the background, far from the eyes of the public, made moves that affected those relations? Were the "old forces" still able to create social and political relations on the Serbian political scene? My impression is that it was an informal organization, but that a group of influential people stood out and was able to create (retrograde, author's note) currents of history. The writer and academician Dobrica Ćosić, the "father of the nation", and the president of the state for a short time, is in the first row, and right next to him are the philosophers Marković and Tadić (father of President Boris Tadić), as well as Koštunica. The pyramid continued to spread to the leadership of JUL and SPS. From the outset of the changes, the cards were confusingly shuffled, but it felt that for the most part nothing was accidental. Of course, I know that I am not a proven connoisseur of circumstances, but it seems to me that I managed to connect the relations with SPO, which I wrote about, but also the role of JUL in the formation of the Serbian Progressive Party, SNS, because I happened to meet Milan Božić again as an important actors in communication and combinatorics (political, not mathematical) on the same occasion.

During these turbulent events, I worked regularly at the faculty, in classes as well as in the laboratory. These activities relaxed me and separated me from the gloomy reality. Goran and I had two new PhD students in the laboratory, Sava Galijaš and Miroslav Ristić, from physical chemistry, one on the experiment for measuring the cross section and the other for the calculations of the rate coefficients of reactions of electrons with molecules. Later, Mirjana Vojnović was involved in the issue of transport coefficients in gas discharges. We always had a few younger students each, who did graduation or seminar papers in atomic and molecular physics and ecological physics, so it was dynamic and interesting to work and socialize with them.

By the way, since 1998, after the retirement of Professor Kurepa, I was the Head of the Department of Physics of Atoms, Molecules, Ionized Gases, Plasma and Quantum Optics at the Faculty of Physics. I was also the manager of several scientific projects for basic sciences of the Ministry of Science of the Republic of Serbia, such as ON171016 Atomic collision processes and photoacoustic spectrometry of molecules and solids. The projects were implemented in several subprojects at the Faculty of Physics, the Institute of Physics, the Vinca Institute, the Faculty of Physical Chemistry and the Institute for Multidisciplinary Research. The managers of the subprojects were Prof. Nataša Nedeljković from FF, Dr. Dragan Markušev from IF and Dr. Zoran Marković from Vinča. The composition and number of participants in the project varied depending on the included subprojects and groups and ranged between 15 and 20 researchers, including doctoral and master's degree.

In that period, Ana, a student several generations older than the current student, did her graduation work with Goran. Due to the bombing and other events, almost her entire generation was a few years behind in their studies. Ana, from Mitrovica, got married in the meantime, but it was time to finish university and eventually start working. During that time, she lost continuity in her studies and work habits, so she somehow slowly got back in shape. Goran was understanding and helped her whenever he had time. Ana spent a lot of time in the laboratory, so some of her colleagues from the generation were stopping by and hanging out with her. They were a little shy of me and chose a time when I wasn't there. One of her friends, Jasmina, also got married and together with her husband won an entry visa for the USA in the lottery. She sent various applications to continue her graduate studies there, and she asked me for a written recommendation, and in the end she got a place at the University of Florida, with free admission to the astrophysics program. Since she had already traveled to the USA, we agreed that I should send her the recommendation by post, or rather, give it to a friend who will pick it up. At the appointed time, Marina appeared who, after completing her studies in general physics, worked as a substitute at the Sent Sava elementary school in Vračar. I must admit that Marina's red hair, with freckles on her face, left a special impression on me. We exchanged a few sentences, I gave her a recommendation and she left. Emptiness was left behind her.

I still regularly stayed in Belgium during the winter holidays. The molecular ion experiment was in full swing. New students came every year, trained to work on the experiment

and then carried out measurements. More results were obtained than we could process and publish. I regularly took part of the results to Belgrade, where I processed them numerically and prepared them for printing, while developing new programs that enabled the research of new complementary channels of reactions or formulas for scaling sections. In this way, sections for the processes of dissociative excitation, DE, and dissociative ionization, DI, were successfully separated. Among the students were, in addition to Belgians and French from the border areas, mostly Moroccans, francophone's, but also Chinese.

The age structure of the Chinese was strange, they were older, did not speak French, and had problems with the English language. The first Chinese, Chang, already mentioned, worked on the ion beam from the cyclotron. A couple of times he was found in the dangerous radiation zone, which was strictly forbidden. After that he fell seriously ill. Another student, Yu Dejang, was over 40 years old. He came from the provinces, was taken without his family to Beijing for training and from there he came to LLN. He was diligent and obedient, but clearly had no research experience. In his spare time, he copied the technical details of the experiment and created meticulous documentation. It seemed as if he was on an undercover mission, although nothing was hidden in the laboratory. After three years, he received his doctorate and returned home. He received a computer, a vacuum stand and an old mass spectrometer from the institute. He remained in contact with Defrance for some time, he was a respected university professor in China with international

experience and reputation, but he did not have any new research results, there.

Since then, I have no great confidence in China and the Chinese. This position of mine was confirmed a few years later by the director of IOFH Branislav Simonović, Sima, with whom I collaborated on the revitalization and reconstruction project of TENT A and B in Obrenovac. As a distinguished physicochemist and director of a scientific institute, he was informed by our Chamber of Commerce about the announced international competition and the possibility to visit China and possibly establish scientific and technological cooperation.

"Dear Belic,

As of two days ago, I am privately in Houston and will stay here for a month.
International Chinese Academy of Sciences "Silk Road" announced a competition for projects and people from 35 countries applied. They chose 10 projects that were important to them. One of those projects was my project. They paid for my trip and stay there. I went to Xiamen (pronounced Xiamen or Siamen), a city in the south of China with about 4.5 million inhabitants. They also have a university, which was then ranked 55th in the Shanghai list. That university has 1 million and 150,000 square meters of space (I don't know if all universities in Serbia have that much space at their disposal). They have about 30,000 students. Among others, they have a faculty of chemical engineering, which I visited. My Institute then became a member of that Academy, and so did I personally. They

organized so-called forum where the selected projects were presented. An exhibition of posters was also organized, they also translated my poster into Chinese and printed it, and all the posters were displayed all day in the great hall of the library. They have a huge library, on 6 floors, with a cinema and theater hall. I gave a lecture at the Faculty of Chemical Engineering. The vice dean met me because the dean was on his way. In general, from the very welcome at the airport to the tour of the university, everything was organized as if we were a state delegation. Two luxury cars with four Chinese plus 2 drivers waited for us at the airport and drove us to the hotel. The hotel was from the English Langham hotel chain. I was accompanied by a doctor of chemical engineering and a graduate student. Everything was organized more than well. I also drove there on the submarine highway (there is no such road only under the English Channel). I also held a lecture at that forum. Even after the lecture, a Chinese professor approached me, congratulated me and said that my project was very interesting for them. And he offered to cooperate. His institute is for oceanography, but they have different departments and deal with different studies. The university is equipped as with "headaches". Everything new, equipment, computerized classrooms, video beams everywhere, everything air-conditioned, etc. For them, we are, roughly, the Middle Ages.

And when I returned, we made a cooperation agreement with that institute and jointly competed with my project. A contract on Chinese-Serbian scientific cooperation was signed and 2 projects in Serbia and 2 same projects in China would be financed each year with $200,000. I applied here

and submitted everything on time. After a few months, I went to the Ministry of Science in Serbia to see what happened with that project. And I realized that with us everything was agreed in advance as to who would get the money. They told me that my item is not in the computer at all. I showed them the confirmation of the electronic submission of the project. And after a few days they told me that my project was not even considered because, allegedly, the Chinese side did not accept it. And that professor from China told me that the project was accepted there because they knew the assistant minister of science well. But our movers did everything to eliminate me because the money was intended for someone else in advance...

When I returned, I wrote an email to the rector, Ivanka, that I could help them to establish cooperation with that university, but I did not receive any reply. There I also met the rector of that university, and a member of the Chinese Academy of Sciences, who was the organizer of that meeting in Siamen. That's how my Chinese trip ended. Greetings", Sima.

I had no reason not to believe Sima's story. He also showed me photos from the trip from China. However, I was only partially impressed by it. The said university seemed to me like a ghost town. I didn't see the atmosphere of a living university anywhere, and more importantly, I didn't see real students either. It all seemed to me like some well-crafted, modern Eastern sci-fi fairy tale, with elements of the pyramid banks of Dafina and Jezda, where the stakes were a mixture of virtual money and virtual scientific reputation. The main actors were the administrations of the two states, which were bound by "iron friendship", as well as many similarities. The

described activities can be explained in different ways, but relevant facts and arguments are missing for any valid analysis, and for us it will remain unknown for now, as well as the further scientific career of the "esteemed" Professor Dejang.

I, for example, with Belgium, France and the USA have never had the kind of experience that Sima described with China.

Belgians valued order and work, they did not venture into other spheres. They avoided comments about the situation and events in Yugoslavia, because these were serious matters, about which they did not have enough information.

However, when they talked locally, the Belgians, like the French, loved to gossip and gossip about each other, but it was mostly harmless stuff, often laced with humor and unexpected twists. There were no forbidden topics. In the afternoon discussions, on Fridays in the studio with a cup of coffee or tea, the topics were everything from tennis to demography and religious topics. In tennis it was the era of Kim Clijsters, in the studio there were a couple of books about her games with professional photos. Demographic issues were also often discussed. In Belgium, the number of foreigners from the former Central African colonies, Congo and Rwanda, and even more from Morocco, has been increasing rapidly. Morocco was a French protectorate, but in 1956 it became a formally independent kingdom. From that time, the influence of Belgium, which opened its borders for political reasons, grew, and today there are about 300,000 Moroccans living there, mostly Arabs, but with numerous

Catholics. It is not rare that, due to the lack of manpower, dark-skinned Congolese or Moroccans are found as Catholic pastors in the smaller towns of the French-speaking part of Belgium. Such an example is the brother of one of the students, Hind, who is a priest in a church. And in the church of Prof. Brouillard, the priest is Congolese, for whom he has a lot of respect and sympathy. He told me that as a member of the church board, he met the person who was elected to the position by introducing himself as a physicist. "I'm glad," replied the priest, "I'm a metaphysician". I also met him once at lunch at the Brouillard family, a very interesting and pleasant man. Such acquaintances are increasingly inevitable in Western countries due to labor shortages and the influx of migrants. It is a reality and a generally accepted phenomenon.

That year, after returning from Brussels, I was invited to give a lecture at the Annual Seminar of the Society of Physicists in Vrnjačka Banja. I decided to go with a colleague from Belgrade by car, since he is also coming back a little earlier, so that I could keep him company. I had already prepared a lecture and slides on the new cross section measurement results for a series of methane hydrocarbon radical and molecule ions. During the afternoon before the start of the program, I walked along the main street in Banja. A large number of seminar participants had arrived. In front of a kiosk in a group of physicists, I noticed a student, Ana, who had prepared and defended her graduation thesis with Goran in our laboratory a few years earlier, and greeted her company. Three of their friends came, including Marina, a colleague to whom I gave recommendation for Jasmina, for admission to doctoral studies at the University of Florida. I

felt that special impression again when I saw her. She was red-haired, with freckles on her face. Ana went into the kiosk to buy hair clips, and the two of us took a short walk. The conversation flowed easily; we had many topics and questions for each other. The river that roared over the stones in its shallow bed completed the atmosphere. Ana's breathless voice carried us from the conversation: you left me. We were laughing. Marina had a characteristic broad smile with two striking rows of large, regular, distinctly white teeth. We continued walking, the weather was pleasant.

The following morning, at 9:00 a.m., the seminar was opened by the president of the DFS, and the attendees were greeted by the Minister of Science, Dragan Domazet. I then held the first introductory overview lecture. It was adapted to the audience, teachers and professors of primary and secondary schools. I briefly explained the principles of measuring the effective cross sections of atomic collision processes, and I explained more the reasons why we do it, as well as the possibilities of applying the obtained results for various practical processes, for the development of technology, light sources, energy production, the role of atomic processes in the atmosphere, the impact on the environment from ecological aspects, etc. I also listed several examples that could be demonstrated to students as part of experimental exercises.

During the coffee break, I agreed with the colleague who drove me, that after lunch and the afternoon program we would return to Belgrade. Before leaving, I wanted to see Marina one more time and say hello to her. I didn't have her phone, but I knew in which hotel the three of them were

staying. I stopped by the front desk and said my name and her first and last name, and the room number was found on the guest list, and the receptionist was kind enough to inform her that there was a visitor in the lobby and ask her to come down. I sat in the armchair for a few minutes and soon I heard her hopping down the stairs. The first thing I noticed was her wide smile, she was happy. I said that I was leaving for Belgrade soon. We talked a little more, she gave me the phone and we said goodbye.

This happened on the eve of the 1th May Day holiday. For May Day, I sent her an SMS message with the following content: Dear colleague Marina, I congratulate you on May 1st Labor Day and I wish you to spend it happily. She answered me and thanked me, we agreed to have a drink in the evening and walk along the Sava promenade near Block 70, where she lived at the time. That was my neighborhood a few years ago. I lived in the new Block 70A, and that's where, among other things, in 1983, exactly 20 years ago, I kept the ferry service from New Belgrade to Ada Ciganlija, exactly between blocks 70 and 70A, on the left side of the river. The "Bombay" restaurant was not working now, so we sat on the third raft upstream from it. We chatted casually while having drinks.

My car was parked by the embankment, so when we left I suggested that I drive her to her building, to the first intersection in the Youth brigades. I stopped and opened the right door, expecting her to get out because I wasn't allowed to stay in the intersection for long. She hesitated, and then laughed softly: I don't feel like going out, let's drive a little longer. I turned the car around and returned slowly to Sava.

There I turned again and returned to the previous intersection. I parked under a tree. We talked for a long time. That's how our relationship began.

Marina worked in an elementary school, teaching physics on a substitute basis. She got a new job and decided to move there. In addition to her new job, she was also looking to rent an apartment, so she decided not to go on vacation that year. At that time, I was already divorced, I lived alone, and I had not gone to the sea for a long time. I invited her to consider going somewhere together, but she categorically refused. Our relationship objectively did not have any perspective. Not because of vacation, but because of a series of differences between us. I was much older than her; I was divorced and had two daughters. It was inappropriate for me to enter into any serious relationship with Marina. I felt I had no right to influence her life at all. She was young, she was not getting married, and life was just beginning for her in the true sense. I thought it would be best for both of us and fair for me to part ways. I liked her a lot both for her looks and especially for her character, but she has the right to her chances in life. I decided to go to the sea alone, the weather and the sea will do their thing and although it was a difficult decision, it seemed to me that it was the best. Especially for her, and as soon as possible. I decided to go for a week to Sutomore, to Inex's Golden Coast resort, where I had already summered before. I told her everything and got ready for the trip. I traveled by train from Belgrade to Bar, in a couchette car. I left in the evening and arrived in the morning, around noon I was already at the hotel. It was great weather, I paid full board

and enjoyed the sun and the sea and the really beautiful surroundings. I walked a lot and it really pleased me.

On the third day, after lunch I sat on the terrace, listened to soft music from the loudspeaker and read something. The maid cautiously entered the room to empty the wastebasket. The monotonous sound of incoming waves hitting the rocky shore below the terrace at one point is interrupted by the ringing of the telephone. I didn't pay attention; I thought it was in the room next to mine. I continued reading, but the maid came out on the terrace and said that my phone was ringing. I didn't register that I had a phone, nor did I send or call anyone, so I said it's not for me, maybe it's for the guests who were there before me. The housekeeper answered the phone and then asked me if I was Dragoljub. Yes, I said, well then it's for you. I picked up the phone, it was quiet, and then Marina's voice answered timidly. I hope I'm not disturbing, she said, how is it at sea? That was the first time I got to know one of her characteristic features, when she wants something she makes it happen and there is no obstacle she cannot overcome. I was surprised, but also happy. She informed me that she had found an apartment near the Zvezdara Theater and that she was moving at the weekend. With this move, she broke my strategy to stop seeing each other.

I tried to end the relationship again later, for the same reasons. We sat at Orač on Trošarina and considered our relationship and its perspective. There were arguments both for and against. A few tears were flowed. We were sorry to change the relationship; it was a mutual conclusion, because it was nice for us. The free relationship we had was the key to

a longer relationship. This conclusion was essential, and we both accepted it without comment. So let it last as long as it lasts.

In the meantime, Marina was looking to buy a small apartment, a room, a studio apartment, anything on the outskirts, partly from modest savings from selling perfumes during her studies, and partly from her parents' promise to help her as much as they could. That year, she found a studio apartment in Rakovica, in the workers' colony in Borska Street. It had a small footprint, with a miniature attached bathroom and sink and a hanging kitchen in the corner behind the door and a large window that looked out into the pine grove between the two buildings. Her little house, her free house, chirped with happiness. The other tenants were working families, poor but honest and decent people.

I helped her furnish the apartment, she bought the bed, and we made the wardrobes, shelves and table ourselves, because I had experience with cut panel boards and dowels and making various furniture from that. With her ideas and a couple of old repainted chairs, an antique wall clock and a miniature hanging library, the apartment was cozy and looked beautiful.

A little in jest, a little in truth, I told her that she can get married now. Why should I get married now when I have everything I need? That topic still hovered between us. We spent more and more time together.

The following summer, we spent our vacation in Đuraševići in Boka Kotorska, near Tivat. We were in a small new villa that had just been bought by Martin Rosengren from

Stockholm. Martin was a close friend of our painter Filip Bulović - Lippi, who worked in Stockholm. Martin liked Boka from a trip there and wanted to have a house in the warm sea, where he can swim to his heart's content, unlike in Sweden. The house had just started to be built and had a living room and a kitchen with a large terrace. My friendly task was to survey the location and terrain and possibly suggest what could be added to create a residential house for a longer vacation for a larger family. I had a similar task for Fillip's cottage, which he bought in Ritopek near Belgrade, and which was turned into a two-story house with a spacious painting studio and a depot for paintings on two levels.

The house in Đuraševići had a spacious lot, with a concrete road to the highway and access to the sea. From the terrace there was a view of Tivat, the Island of Flowers, Stradioti and Our Lady of Mercy. About 10 kilometers away is the beautiful medieval town of Kotor, with the largest fortification for the former defense of Montenegro against foreign military invasions, by the sea.

The extension plan consisted of two phases. In the first phase, the extension of the ground floor for two more bedrooms and an entrance hall with an internal staircase to the first floor is proposed. The second phase included the construction of the first floor of the same structure as the ground floor, as well as the upgrade of the attic with two rooms and two large terraces. These were only conceptual sketches; the detailed elaboration was left for construction experts and contractors. Towards the end of the stay, there was a great feast of Our Lady of Škrpjela, dedicated to the church, the patron saint of ships and sailors. The church was built in 1630. on an

artificial island near Perast, which the inhabitants built for centuries by bringing stone from the coast in boats, and they still do that today on that holiday. In the evening, there is a big party in the town square in Kotor with drinks, music and dancing. Before the festival, in a small store, in a narrow alley, I found Ecco leather sandals, number 46, which I had been looking for a long time without success; it was at a 50% discount. This put me in such a good mood that I immediately jumped on the dance floor, took my sandals out of my bag and spent the whole evening with them to the rhythm of really good dance music, which lasted until midnight. I transferred the energy to Marina and to the group of surrounding players and we were the happiest. When the gig ended, we found ourselves in a problem for transportation home. We tried to hitchhike, and miraculously, we immediately succeeded. We were picked up in a jeep by a couple from Slovenia who was going in our direction and who spent the evening playing with the group around us. When we got to know each other a little, the driver praised our performance and complimented us with the words: Well done, you whitened your face. It took me a while to translate that it actually means: you have brightened your face, you have shown yourself in a good light.

At the end of our vacation, we set aside one day to go to Dubrovnik, after ten or more years. We reserved seats in a van that left before noon and returned in the evening. I experienced the first impression on the Adriatic highway, covered with new asphalt without a single pothole and without scattered garbage on the side of the road, which was unimaginable for Serbia and Montenegro at the time.

Dubrovnik once again enchanted us with its architecture and the beautiful nature of its surroundings. We once again concluded that the Adriatic coast is among the most beautiful in the world.

Towards the end of our stay, we noticed at the end of Stradun, before the exit to the small port, a room on the left that was dedicated to the memory of the victims of the last conflicts between the armed forces of Montenegro and Dalmatia. A meaningless conflict, like all the others. I bought two candles, entered the room and lit them in memory of the victims, both Catholic and Orthodox. I dedicated one to the Croat Šarčević, we called him Šarac, from Dubrovnik who served with me in the JNA in Kruševac and whom I heard was killed here. The second one was intended for a beardless young man from Obrenovac, who lived in my street, he was shy; he would blush when girls were mentioned, so we called him Rumeni. He was mobilized and just one night he was silently brought to his parents in an ominous military vehicle, and he died on the battlefield in Dubrovnik.

Life went on. Both Marina and I loved nature and travel. We spent the next few vacations in Cavtat, a small picturesque place south of Dubrovnik. There were about 2,000 residents, a good part of whom we knew and would contact when we met. We were attracted by the proximity of Ćilipi airport, which can be reached from Belgrade in less than one hour. But the main reason was the beauty of untouched nature, which hasn't changed since my first stay, back when I was attending high school and going on an excursion to the student resort in the middle of the town. The main attraction was an uninhabited peninsula with a landscaped path that ran

along the rocky shore with rows of huge pine trees on either side, so you were constantly in the shade, at any part of the day. From the trail, you could see Dubrovnik, especially beautifully lit at night, as well as all the places along the highway leading to it.

In May 2006, I was invited to the 6th Congress of the Balkan Union of Physicists (BPU) in Istanbul. Until then, I had not been to Asia, the congress was short in duration, and the program was interesting and ambitious. I was particularly curious to see if the Turks had bought a Cyclotron from IBA of Nouvelle Louvain, Belgium, which they were trying to do at the same time I was interested in a similar device for the Vinca. At that time, Turkey had a strong promotional campaign for tourism and development, including science, so that also increased my interest.

Istanbul was a revelation for me in every sense, as a different civilization, architecture, nature, religion. Everything was so different, yet similar to our mentality.

In the evening after my arrival, I attended the welcome cocktail party at the University. The university was in a phenomenal location on a hill in the center of Golden Horn. Access to the university was strictly controlled, with identification cards and passes. By the way, I asked the hosts present if they had acquired the aforementioned cyclotron, to which they reacted somewhat confused, as if they were hearing about it for the first time. It is obviously a story and a similar project as with the one in Vinca. The opening of the congress was held in a huge ceremonial amphitheater. It began with the singing of the national anthem and the

unveiling of a huge painting in the background of the stage, which featured the image of Mustafa Kemal Ataturk, the founder of the Turkish Republic in 1923. I was not prepared and familiar with the recent history of Turkey. I didn't even know that Turkey was organized as a republic and that it was created under the strong influence of the Bolsheviks from the Soviet Union. It also became clear to me why on its red flag, in addition to the Ottoman symbol of the crescent moon, there is also a red five-pointed star as a symbol of communism, or later Kemalism. The recent history of this country and its vital people is very special and interesting, after all, just like the earlier era one, but we will not deal with that here.

I liked the Bosphorus, Topkapi Palace, Kapalikarshi, Asian coast, sunset over Hagia Sophia and Blue Mosque, strait cruise, powerful ships to transport passengers across the strait. I went to Istanbul several times with Marina every year. Until a Turk spoke to me in Turkish on the street, gesticulating briskly, so I didn't have time to answer him. When I finally told him in English that I didn't understand him, he replied that he was convinced that I was also Turkish.

In 2010, I received the Annual Award for the most successful scientist at the Faculty of Physics of the University of Belgrade. I received the award for publishing ten scientific papers in leading international journals in that year, as well as for the overall contribution to the development of science at the faculty. This number of published papers in one year was common as the scientific output of colleagues from abroad with whom I collaborated. It is a reasonable outlet for serious, original scientific work for successful teams. Already

at that time, the anomaly of hyperproduction of publications appeared in our country. Some researchers appeared with tens or even a few hundred publications a year, such as some officials at the Ministry of Science or members of SANU. Larger teams were formed, a large number of co-authors were signed on the papers, and new "dubious" journals were formed and financed, without valid independent review. Publishing has become a business. There are "wild" magazines that print anything with the appearance of an international review for two thousand euro. For example, if someone publishes a few hundred papers in a year, one must ask what the quality of those papers is. Does that author manage to read all those works, if objectively he has a few days per work?

For normal conditions, it was unrealistic, but it passed. Valid criteria were being lost in both science and studies. There has been a real devaluation of work and values at all levels. Exams were taken lightly, without the necessary effort, graduate theses were given away or literally bought over the Internet, and even some doctorates were worthless, in some cases plagiarized. Incompetent "experts" occupied important positions in the state and it was becoming a mass phenomenon, and the competent institutions had neither the strength nor the will to stop it. Some faculties tried to challenge the plagiarism, a platform was even acquired for their detection, but the government in Serbia was more brutal.

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In the spring of 2011, while I was reviewing some control assignments at the university, my office phone rang. It was an unknown man's voice who introduced himself as Ivan Perić, the development director of Klett Publishing House from Belgrade. He apologized for disturbing me, we don't know each other personally, but he is contacting me on the recommendation of his father-in-law, Iztok Čadež, my fellow physicist from the Institute of Physics in Zemun. He asked me to meet when I am able in connection with my possible involvement in the editorial office of Klett.

At the appointed time, a young energetic man with sharp short hair sat in my office. It was Perić, until recently a professor of philosophy at the First Belgrade High School in Dušanova Street in Dorćol. His wife Ida was a physics professor in the same gymnasium, and I knew her through her father Iztok. Before he started working in Klett, he was the director of the gymnasium for several years. I also knew Ida's mother and sister, because we used to live in the same block, 70A, in New Belgrade, and we spent a year at Colorado University, where I worked, during the same period.

Ivan was a pleasant, educated and eloquent man, so we talked for a long time. His idea was to discuss my eventual involvement in Klett, in the capacity of author or editor for

elementary and high school physics textbooks. I don't know if he might have heard about the action I started about 25 years ago at the Faculty of Physics, but he hit on a sensitive subject. When my older daughter was in elementary school, I had the opportunity to familiarize myself with textbook literature on physics. In addition to being full of spelling and material errors, it was often unclear, monotonously written, without style and inappropriate for the age. Year after year, the quality decreased and in the end perhaps only the interest of one group of people prevailed. Several professors and assistants from the faculty would gather, divide the material among them and write each part of it, then connect them into one whole. Sometimes the same physical quantities were denoted by different letters or symbols, and a mismatch of style and level was often observed. A small number of sparsely illustrated images were included, and the examples were not always clear and thought-through, or detracted from the text. I presented the aforementioned situation at the Teaching Council of the Faculty, as well as at the session of the Presidency of the Society of Physicists of Serbia. Everyone agreed with the description of the situation, but that was where the story ended. No action has been taken to remedy the situation.

In such a situation, I launched a personal initiative. I gathered several younger colleagues and organized several meetings in the faculty library. I insisted that female colleagues be included, because until then they were not among the authors, and the second reason was that they are, in principle, more meticulous and responsible in their writing. Dr. Suncica Elezović stood out among them. As a first task, we decided to

collect a number of foreign textbooks, to analyze them and decide on supporting models. I brought a set of textbooks from Belgium, there were also books from Slovenia, France, Germany and a few more. We kept the books on a special shelf in the faculty library, and there we would meet with suggestions on how to proceed. We concluded that it would be a big project and that some kind of support for material costs, editorial staff, proofreaders, etc. should be formed. I tried to talk to Rector Purić about the implementation of cooperation between the Institute for Textbooks and Teaching Aids and our group. “I can provide it, but you know how it works? Someone must be involved from us in the government, as a cover, in order to organize it". Here I can be your cover. When I brought it up to a group of colleagues, the proposal caused an outcry and the existing enthusiasm died down. Well, we had coverage until now, and we see that it gave bad results. We were forced to wait for better times. Now it seems to me that those better times have come, with colleague Perić and the professional relationship of new publishing houses, like Klett.

Ivan's first idea was for me to get involved in an already existing project with a Mathematics high school professor, a project that did not start with good reviews, for a textbook for the sixth grade. My experience was not in favor of "text patching". I explained that it is difficult and the result suffers from how the previous text was conceived and written. Writing must be thought out; it is not just the arrangement of letters and lines. Due to other commitments, I was not able to meet the relatively short deadlines, so I thought about other solutions. At the next meeting in Klett, I had a new proposal.

Marina wrote well, both technically and stylistically, and won prizes in school competitions even while she was in high school. She knew the subject and had many years of experience in teaching in primary and secondary schools. I consulted her and she agreed to try writing, provided that I would be involved, either directly or as an editor. Ivan agreed with that idea. A trial text, which was implied in Klett procedure for hiring an author for a particular class, included peer review by a number of teachers from the class being written for. That condition was fulfilled with satisfactory grades. That's how we started our long-term cooperation, Marina always had with her the subject programs and Ivan Klein's spelling manual. She was incredible in her dedication to work, in this case writing. I had tremendous confidence in her.

For me, this writing was great fun, at the same time a pleasure and a responsible fulfillment of an obligation or a vow to do something useful for the young generation, which I have long felt as a debt to upbringing and education, of which I myself was a part and participant. That's simply what I liked to do, regardless of the level of education.

Writing was easy. Marina and I competed to see who would give the best example, which would make a better and more illustrative graphic, which would illustrate or find a more adequate image for a phenomenon. We first made a textbook and then a collection of tasks for the sixth grade of elementary school.

Of course, I worked a little less on these jobs, because at that time I had a lot to do with the Belgians. Two doctoral theses

were written on molecular ions. There was a lot of work related to the normalization and processing of measurement results, writing theses and papers for journals. There was also a lot of work in the Laboratory in Belgrade on measurements of angular distributions for electron scattering at 0 and 180 degrees, forward and backward, for the excitation of higher electronic states on hydrogen and CO molecules. In Belgrade, we also worked on designing a new experiment for measuring the cross section for dissociative ionization and electron capture on small neutral molecules, along with the detection of charged ion products.

This experiment was led by Goran, and it relaxed me a lot. He opened another channel of research, which was the simulation of gas discharge in electric and magnetic external fields crossed at right angles, and later in their arbitrary combination. In this way, the discharge transport coefficients and reaction speed coefficients of the excitation and ionization processes were calculated. This enabled the use and practical application of a large number of previously measured cross-sections and produced a series of papers of interest to gas discharge and plasma researchers.

The experiment with the detection of charged ion products was current at that time and its various variants were realized in several laboratories from France to Japan. Most experiments of this type used the extraction of ions from the collision volume at an angle of 90 degrees to the electron beam. We soon saw the shortcomings of that geometry in terms of incomplete transmission and changed the setup to an axial geometry, with electron beam modulation and ion detection in a direction parallel to the electron beam. That

condition imposed a change in the original concept and a request for the acquisition of additional high-speed electronics for electron modulation, as well as for coincident ion detection, which was also successfully implemented.

The set of textbooks and collections for the 6th grade of elementary school was completed on time, in accordance with the signed contract. The selected evaluators rated the material positively, with minimal technical remarks and the reviewers gave a positive opinion. The manuscripts went to the editorial office of Klett for proofreading and technical processing of the text. This successfully completed the writing for one class. Ivan Perić and the management of IK Klett were very satisfied. Then they put forward a proposal to further speed up the writing, in such a way that I remain the editor at the same time for the VII and VIII grades, that Marina be the author for the VII grade, and that a competition for the selection of a new author be announced for the VIII grade. The selection was made on the basis of two written lessons that potential candidates would submit anonymously. I was against that idea, because the program for elementary school represents one unit that must be homogeneous, written "from one pen", but I agreed to carry out the proposed experiment.

The received materials, for the same class, were so inhomogeneous and mismatched that they could not possibly be in the same book, with different styles, different markings. It was clear that it would not work and my position was accepted that all textbooks should have the same signature and that only in this way can a top result be expected. We moved on to the next grade and thus ensured the successive

continuity of printing textbooks for elementary school. We worked at the same pace, finished writing a textbook and a collection of exercises for grade VII in a year, and then continued writing for grade VIII as well. We already had adopted tools for writing and marking lessons, introductory notes, reminders, exercises, summaries, questions and answers, experimental exercises, new concepts, etc. In this way, an extremely high-quality set of textbooks and collections in physics for elementary school was obtained.

At the same time, several other publishing houses joined the reform of primary education and the writing of new textbooks for physics from the sixth to the eighth grade. New textbooks were successively put into circulation through the tender of the Ministry of Education. When the market stabilized after three years, IK Klett positioned itself in first place in terms of sales in the total number of sales and use of physics textbooks at that age in Serbia.

The next project that followed was writing and equipping textbooks for secondary schools according to the new programs. This applied to all four classes of general, natural-mathematical and social-linguistic high schools and all secondary technical and other schools that have the subject of physics in their program in certain classes. Due to the number of schools and the variety of programs, it was quite a complex task. I remained the editor for physics and I suggested that textbooks for natural-mathematical gymnasiums be created first, as the most comprehensive, and then that textbooks be generated based on them for other types of gymnasiums, as well as for other secondary schools, depending on their number and the need for teaching. Klett

accepted this, but insisted that due to the volume of work, separate authors should be hired for each grade of each type of school. That is, for me as an editor, the scope of work was significantly increased, but the pressure and responsibility were reduced by a significantly smaller number of secondary schools compared to the number of primary schools, as well as by the existence of autonomous programs for individual secondary school courses, and also by the mutual similarity of the programs.

To begin with, I surveyed and proposed authors for writing textbooks for high schools in natural and mathematical fields. Prof. was proposed for the first class. Ph.D. Ljubo Ristovski from the Faculty of Physics, for the second class, Ph.D. Dragan Markušev from the Institute of Physics, for the third grade it was me and Marina Radojević, and for the fourth grade it was Prof. Ivan Aničin, also from the Faculty of Physics. Since in the fourth grade physics is also part of the program for astronomy, Dr. Olga Atanacković from the Faculty of Mathematics has been proposed. It quickly became clear that working on high school textbooks was significantly more demanding than on those for primary schools, primarily due to the sensitivity of the chosen level and scope, as well as the prior knowledge of the students.

The first edition of the new series of high school textbooks was printed and accepted in the schools, but I was not completely satisfied with the result. In the next edition, a couple of authors were replaced, and then an agreement was made in the form of a gentleman's agreement with IK Logos and IK Freska to redistribute the programs between them, and in the next edition IK Klett printed only Physics III for the

third grade. I was satisfied with this edition, because I think that electricity and magnetism and all the accompanying phenomena and applications are important for modern times, including both ecological and sustainable energy production trends.

As part of the cooperation with the Society of Physicists of Serbia (DFS), I initiated the initiative to relaunch Young physicist, a magazine for students and friends of physics, which has stopped being published for several years, under the auspices of IK Klett. A new editorial board was chosen and the magazine flourished, with a new identity and graphic design, which even National Geography, which was also published by IK Klett for a time, could envy. The first among the new editors were Prof. Ivan Aničin and Prof. Srđan Bukvić. The revitalized journal was then brought back into print under the auspices of the Society of Physicists, DFS.

The emerging era of digitalization, which followed the development of computing, mobile telephony and the application of digital platforms in almost all areas of everyday communication, has largely affected education and especially school textbooks and aids. As much as I enthusiastically embraced the development of computers and programming in science in the 1970s, I was less enthusiastic about the latest trend. I thought now that digitization should be accepted with moderation. I recalled that at the beginning of the application of large storage media, there was a belief that books and printed materials would become obsolete at the expense of the development of digital libraries. However, that did not happen. There were several reasons, the most important of which were related to the tradition of learning

and the advantages of printed matter in terms of visibility and convenience for everyday use and in every place.

Well, there has been a recent trend to translate school textbooks into digital versions. IK Klett followed the development of modern technology, so they chose digitization platforms for various fields of education. The books were tracked with barcodes and packaged in formats accessible to mobile applications. In my opinion, it was useful, but the mere presence of mobile devices to some extent allowed distraction and, it seems to me, a disproportionate waste of time compared to classic textbooks. Maybe I'm rigid and used to using the classic mode. As authors, we participated in the preparation of materials and editing of digital editions, but with little enthusiasm. We will leave it to time to tell what the further development of writing will be, especially in light of the modern development of artificial intelligence, AI.

After staying in Istanbul and Egypt, Marina and I expanded our list of destinations, which was enriched by trips to the Mediterranean. We explored several locations in Tunisia, starting with ancient Carthage. Then it was Malta's turn with a focus on Valletta and Sliema, easy trips of up to two hours from Belgrade for an extended weekend with Wizzair, at the end or beginning of the season. We have perfected the technique of packing luggage on an average backpack, and without reserving a seat, at bargain prices. We also went to Crete, Cyprus, Munich, Barcelona and Nice several times a season.

The year 2014 was particularly exciting. First, at the beginning of January, my older daughter gave birth to my grandson, Sava. Even in the first days, while they were in the maternity ward, I impatiently asked Rajna if he was walking and when he was going to talk. In the middle of May of the same year, there was a big flood in the Obrenovac region, in which our family house was flooded up to the roof, which drastically affected the life of our mother, brother and his family for a long time. They were rescued by boats after several days of isolation and imprisonment without electricity in the attic of a house in the neighborhood.

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I was supposed to be retired regularly in 2016. However, the previous year, amendments to the law were adopted, which exceptionally for university professors, at the request of the faculty, it was possible to extend the regular employment relationship for a period of two years. Probably someone important for the state should have had his employment extended, so the rest of us also fell under the "collateral damage" category. Later, the law was changed once more, so the rest of us also received a total bonus of four years. It was just at that time that I was able to complete the remaining work at the university, of which there were quite a few.

First and foremost, I have some commitments left in Belgium. Older colleagues there have retired, so I needed to finish writing and printing some scientific papers that were left. I also had one unfulfilled wish left, and that was the measurement of the effective cross sections for dissociative ionization and dissociative excitation of ions of the ozone molecule, O_3^+. Ozone was an unsolved puzzle for me. It was discovered that it is very important, both directly for ecology, and for warming the atmosphere, that is, for global climate change. Cross-section measurements for ozone were very few and rare, there were indications of its large role in the atmosphere, but, on the other hand, it was extremely exotic and inaccessible. I always put off its research as a job with an

uncertain outcome. Now it's time has come. I had at my disposal both the experiment and the time and support that the younger colleagues there could give me. Ozone and me!

Without much philosophy, I tried to make ozone from molecules of ordinary oxygen, O_2. I introduced oxygen into the ECR (Electron Cyclotron Resonance) ion source and turned on the discharge voltage and magnetic field current of source. I detected the beginning of the gas discharge on the discharge current indicator. I opened the ion transport valve towards the collision volume and detected a positive ion current on the Faraday cage. It was a collective signal of the detection of positive ions, atomic and molecular, so O^+, O_2^+, but perhaps also ozone and other residual gases. I included a magnetic field to analyze the composition of the primary ion beam. When the magnetic field stabilized, recorded was the first mass spectrum. I increased the magnet current to twice the usual value for diatomic molecular ions. The standard shape of the oxygen mass spectrum was obtained, which consisted of a series of peaks. The spectrum started with a peak of atomic hydrogen and hydrogen molecules which are always found from the residual water molecule. Then follows the residual helium atom, then atomic oxygen, close to it the radical OH, then the ion of the oxygen molecule. It was followed by several small lumps, none of which could be immediately identified. It was only with increased measurement statistics that the structures among which the ozone ion should have been searched for began to be indicated. The next important step was to optimize the discharge conditions in the ion source and increase the ozone current.

The regular ion current of the primary beam, suitable for starting the experiment, was on the order of 100 nA (nanoamperes), or 10^{-7} A. The ozone ion current I first identified was 0.01 nA, so 10,000 times smaller. It was dishearteningly small. The maximum ion current in this experiment reached only 0.2 nA.

(*https://doi.org/10.1103/PhysRevA.91.012703*).

The secret of the success of the measurements that followed and the evaluation of the effective cross-sections for the production of O^+ and O_2^+ ions lies exclusively in the exceptional stability of the beam of primary O_3^+ ions. The oxygen gas discharge in the ECR ion source lasted for an unlimited time and after thermal stabilization gave a constant current, almost without any fluctuations. I quickly concluded that and used it in the measurements. I obtained the final reproducible spectra as a function of the magnetic field of the analysis magnet. The most stable operation of the experiment takes place at night, when both the room temperature and the mains voltage change the least. Statistical errors were minimal and the measurement took place relatively quickly despite the small currents of ozone primary ions. I did the cross-sectional measurements for the detection of O^+ ions in a little more than two weeks. Thanks to a specially developed procedure for determining the profile of the detected spectrum, the correction of the measured cross-sections to the experimental width of the dissociative distribution of ions was carried out, and the results obtained were from 25% at the threshold to three times higher at high energies compared to the results of measurements by Deng and colleagues from Oak Ridge in 2010. This explained why some effects of

interactions with atmospheric ozone are significantly larger than previously assumed. Similar considerations and explanations were later performed with O_2^+ fragments, based on the rate coefficients of ozone reactions with electrons.

These were my last measurements in Belgium. For the next couple of years, I processed the measurement results and did not travel anywhere, because in 2019, the Covid-19 pandemic spread from China. The work of schools and faculties was limited, they switched to online teaching. Marina quit her job at school. We wore masks and restricted movement as much as possible; we received vaccinations every six months. It was only in a few years that a seemingly normal life began, conditionally speaking. However, a conditionally or realistically normal life in Serbia will not begin for a long time. We also wanted to travel.

In 2023, we traveled around the Mediterranean on four occasions. First we went to Sliema, Malta; we stayed at the Marina Hotel, by the sea. Breakfast is served on the terrace on the top floor, overlooking Valletta. That view was the most beautiful for us on the island. In the same year, we were also in Cyprus, in Larnaca, then in France in Nice and once again in the off-season in Malta.

In December of that year, A. Vučić shamelessly stole the parliamentary and local elections in Serbia once again, according to allegations, documents, recordings and lawsuits filed by members of the parliamentary opposition. He stole from the people he was supposed to rule. The last phase of communism is a schizophrenic autocracy, when unworthy, evil and unscrupulous followers are placed in all positions of

power through violence and with the help of intelligence structures, paramilitary formations and criminal groups. Examples of this are the former Romania, the USSR, but also Yugoslavia... Now it is also happening in Serbia. The judiciary, the police, the economy, healthcare, education are degraded, diplomas are devalued and traded. The media and sports are also destroyed, and reality programs, casinos and bookmakers are introduced with incalculable consequences for children and youth. Then the elections are easily manipulated with the help of the media, Bulgarian trains, and phantom voters. The electorate is even divided, for easier and greater manipulation, and voters are imported from neighboring countries, as well.

There are two solutions for solving accumulated problems, sooner or later. One is a radical change in the continuity of power and a break with Bolshevism, and the other alternative is the literal ruin and disintegration of the existing form of community.

* * * * *

When I started writing this book, I thought it would be just my autobiography, maybe a travelogue and a bit romanticized, reminiscences of over half a century of my experiences during my stay and research work in atomic physics in reputable world laboratories. However, over time, events in Serbia began to be increasingly influenced by the turbulent development of social events, stumbling and

negative trends. Now I believe that this book can be seen as my modest contribution to the understanding of those events and an effort to point out the state of society in Serbia, to point out the problems and to try to find a way to restore normality, to recover and reanimate the true values in the country.

* * * * *

The following year, in the spring, we traveled to Munich and then to Nice. Munich left an extraordinary impression on me. The city itself was spacious and well-organized, full of castles, parks, and galleries. An unusually clean river flowed through the center of the city. Museums and art galleries from various eras are everywhere. The surroundings of the city are particularly interesting. Every available part of the space has been processed and used, if for nothing else, then for the installation of solar panels.

Nice is a story in itself, it reminds me a lot of Paris, but it has a more pleasant and relaxed atmosphere. It seems to me that the Cote d'Azur gives her a great advantage and peace. The architecture here is perfect, just like in Paris. It reminded me of my first steps in Paris, getting to know social events and attending private dinners with colleagues. I remembered my bad French and the discussion about the merits of interior or exterior in ambient architecture. The choice of hotel before the trip also reminded me of that. Quite by chance, my attention was drawn to Hotel Le Negresco, in the first row of buildings on the English Promenade. The price is "modest",

18,800 euro per night. It is an exclusive hotel built at the beginning of the last century by the Romanian hotelier Negresco, with the highest luxury at the time, with rooms in the prestigious styles of European courts, original paintings and sculptures of the most important figures of the era. Of course, it never occurred to me to spend the night in that hotel, but it made me go back to thinking about exteriors and interiors once more.

The question is old, what is more valuable and what gives a person more pleasure? From the Florence Hotel, where we stayed, and which was located in the city center, you could see a good part of the core of Nice, but also part of the coast and the Hotel Negresco. I assume that Hotel Florence was also visible from Negresco, at least partially. The view of Negresco was certainly more magnificent. Therefore, the observer from Florence was at an advantage, he had more enjoyment for less effort money.

When walking along Nice's main street, Jean Medsan, from the Central Station to the English Promenade, where only tram line no. 1 runs, you pass Galeria Lafayette, where the Pandora jewelry store is located on the ground floor. In a prominent place on the street was an advertisement for earrings inspired by the painting Girl with a Pearl Earring by painter Johannes Vermeer from 1665, which represents the famous Dutch Mona Lisa, and which was also made into a movie in 2003. It seemed to us that we were recently in the great Pinakothek in Munich saw this painting, perhaps on loan from the Amsterdam gallery or its AI (Artificial Intelligence) replacement.

We entered Pandora twice to check the look and quality of the earrings. I convinced Marina that they were the most beautiful earrings I had ever seen. They had a curved heart shape on the top with a clasp and a shiny natural freshwater pearl on the hanging part. If we had been at the Negresco Hotel, we might not have seen them, and we might not have bought these earrings. They looked beautiful on her. She was delighted with the new earrings.

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Prof. Dr. Dragoljub S. Belić
Full professor of the Faculty of Physics
University in Belgrade
http://www.ff.bg.ac.rs/Personal/D_Belic.htm

Dragoljub S. Belić was born in June 1951 in Obrenovac, Serbia. He graduated in physics at the Faculty of Science and Mathematics of the University of Belgrade in 1974, and received his master's degree in 1977. He completed his doctorate at the *Pierre et Marie Curie University* in Paris, while he defended his doctoral dissertation in 1979 at the PMF in Belgrade. In 1981-82, he was a postdoctoral fellow at the JILA Institute (NBS and *Colorado University*) in Boulder, USA. In 1985, he was elected as an assistant professor, in 1989 as an associate professor, and in 1993 as a full professor at the Faculty of Physics in Belgrade. In 1994, he became a visiting professor for doctoral studies at the *Universite Catholique* de Louvain in Belgium.

At the Faculty of Physics, he taught *Physics of Molecules* at the Research Department and *Environmental Physics* at the Applied Physics and Informatics Department. He taught also

at the Ph.D. studies, *Physics of Atoms and Molecules*. He supervised the 5 master's degrees, 5 doctoral dissertations and dozens of graduate and master's theses at the Faculty of Physics in Belgrade and participated in the preparation of several doctoral dissertations at UCL in Belgium.

He published 3 university textbooks, 3 studies, 2 monographs and over 100 scientific papers in leading international magazines and books. These papers have been cited over 2000 times.

He founded the *Laboratory for Atomic Collision Processes* at the FF in Belgrade and developed a high-resolution double trochoidal electron spectrometer for resonant excitation of molecules at critical angles. He has outstanding results in the study of dissociative capture of electrons on molecules. He made a major contribution to the ionization and excitation of atomic ions relevant for controlled thermonuclear fusion, as well as pioneering measurements of dielectronic recombination on atomic ions and dissociative ionization and dissociative excitation of molecular ions by electrons.

He was the manager of several scientific projects of the Ministry of Science of the Republic of Serbia and the head of the *Department of Physics of Atoms, Molecules, Ionized Gases, Plasma and Quantum Optics* at the Faculty of Physics from 1998 to 2020. He is the winner of the Annual Science Award of the Faculty of Physics for 2010. He is the editor and co-author of a series of physics textbooks for elementary schools and high schools of the IK Klett. He was the first president of the Court of Honor of the University of Belgrade.

Representative scientific publications:

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3. D. S. Belic, M. Landau and R. I. Hall, Energy and Angular Dependence of H Ions produced by Dissociative Electron Attachment to H_2O (D_2O). ***J. Phys. B: Atom. Molec. Phys***., **14** (1981) 175-190.
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Hi Dragan,

Your text brings back nice memories of our work together. Scientifically, it was an amazing, exceptional year that you spent with us in Paris. I see, and I knew that you then went on to have a very successful career. I am very happy to have been part of it. Congratulations. I see you are still as dynamic as ever and with a good memory and able to put it all down on paper. Well done👍👍

Richard Dick Hall

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