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Colloquia: Pontecorvo100

Bruno Pontecorvo in Dubna — Recollections by a former student

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Fig. 1. – On the back of the picture: "2+2=4! You have to know this! B.P.". Dubna, 1978.

Bruno arrived to Dubna in 1950, soon after departure with his family to the Soviet Union. This was well before my time in Dubna, I came to Dubna in 1966. From starting the research institute in the area in 1947, and until 1956 Dubna was a "secret" city. The scientific Institute in Dubna was run by the so called "Ministry for the Medium Machinery", the code name for the Atomic Ministry in the Soviet Union. The secrecy was at the level comparable to military research places, despite the physics institute there has been built solely for the fundamental physics research. The best (in the world!) cyclotron (480 MeV) was secretly built and commissioned in Dubna in 1949. After arrival in 1950, Bruno became one of the first users of this machine. The institute had very young personnel, Bruno at the age of 37 years was one of the oldest, his nickname was the "Professor". The documents which have been declassified since, show that he was doing elementary particles research. Here are some pictures of the documents related to Bruno's work in USSR in Dubna after arrival to USSR (Figs. 2, 3).

Bruno continued to work on elementary particle research. Being contained in the Soviet Union, he collaborated almost exclusively with physicists from the Soviet Union. The shroud of secrecy around particle physics in Soviet Union became less severe in 1956. In 1956 an international institute for fundamental research in particle physics

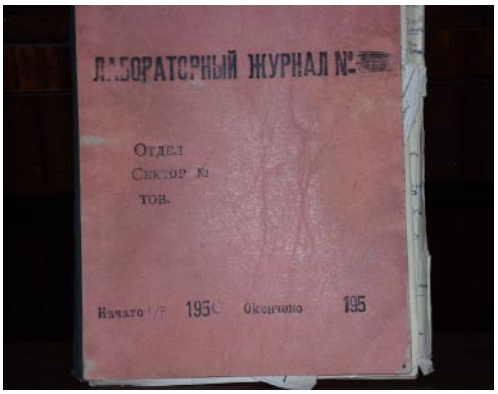

Fig. 2. – Secret logbook for recording the scientific lab work in Dubna in 1950, pages numbered! (Courtesy of JINR Archives).

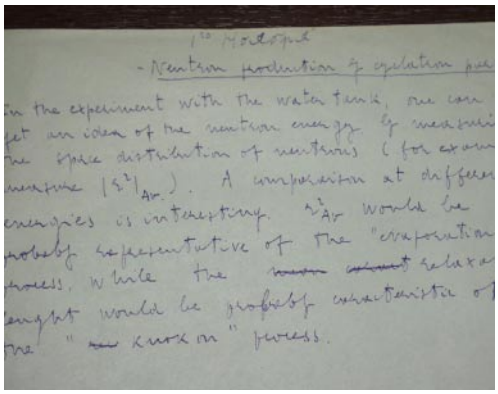

Fig. 3. – The first entry by Bruno in the 1950 secret logbook describing fundamental research with particles at the new accelerator.

has been created in Dubna, in place of the existing secret institute. All the "socialist" countries belonging to the Soviet block became members of the new institute. The name of the new international organization, created as a response to the creation of CERN in Western Europe, was the Joint Institute of Nuclear Research (JINR). Bruno could resume correspondence with scientists in the West, many of whom he knew personally, typically from the time before his departure to the Soviet Union. He followed all the important scientific developments in particle physics in the World. He also resumed publishing his papers with many new brilliant ideas. Dubna became much more open: in the following years Dubna was frequently visited by scientists from different Western countries, but travel to the West for many people working in Dubna remained restricted. Only in 1978, almost 30 years after arrival to the Soviet Union in 1950, Bruno was allowed to to visit a Western country. He went to Italy, and was visiting Italy nearly every year since. He wanted very much to go there for personal reasons. Only in 1988 he visited CERN for the first time in his life. Below are few more pictures of Bruno with other physicists in the Soviet Union (Figs. 5,4,6).

For many years Bruno was teaching particle physics at the Moscow State University. He helped many young particle physicists to find their way in science. I met with Bruno also at the Moscow State University. After getting Master's degree, I have been recommended for the PhD studies in the Moscow State University graduate school. If admitted, I would work on a topic which I liked, but it was not related to Bruno's interests. For some reason, the final decision on admission to the graduate school, as many other decisions in the Soviet Union, was taken by a Communist Party Committee. I was not recommended for admission, as I thought then, deservingly (I was not a perfect student and had disciplinary reprimands). Bruno tried to defend my candidacy for a graduate school at the Party Committee meeting at Moscow State University, and after he failed, next day he offered me a position in his Department in the Dubna's Joint Institute for Nuclear research, and suggested to work on the search of the lepton number nonconservation in muon decays, which later became also a topic for my PhD. I was young, did not understand physics and life in general, and Bruno had to spend time convincing me that it is an interesting and a very important topic, and that working in his Department in Dubna is good for my future. This of course largely defined in a very positive way my

Fig. 4. – S. Gershtein, B. Pontecorvo at the construction site of the Baksan Neutrino Observatory, Institute of Nuclear Research, in 1974.

Fig. 5. – Bruno Pontecorvo and Lev Okun, 1970s. Okun and Pontecorvo have been friends and collaborators.

Fig. 6. – B. Pontecorvo and S. Bilenky at a seminar in 1977. "obviously not too boring".

scientific interests and my professional life for many years.

Besides the most important things: deep influence on my scientific interests, and influence on the direction of my research, I am deeply obliged Bruno for friendship and direct help in critical moments in my life for more than 20 years. Besides offering me a position in his Department in Dubna and suggesting a topic for my research, this includes helping to overcome a very serious opposition from local party leaders, when formally appointing me several years later as a group leader, and later a Department head in Dubna. When the Soviet Union became more open to interactions with the world in the

80s, Bruno helped me to establish scientific and personal contacts with scientists from Western countries. Beginning of 90s was a very difficult time for the science in Russia: the support for science all but disappeared. At the same time all the political restrictions from travel have been finally lifted. Bruno wrote a recommendation letter for me, which helped me to move to the West and continue my career as a physicist. This help was very critical: at that time I did not know many people in the West since I could not travel to the West for many years.

Here I want to mention one quality of Bruno which in my view distinguished him from many other excellent scientists: his superb taste in physics. I heard these words, about the importance of taste in physics, from Bruno several times. Usually the word taste is reserved not to science, but to art and some other areas in life. With respect to science, in similar situations, we usually use the word intuition. I feel that a taste in science is something different, and probably means more than an intuition. While intuition is the ability to see the truth without a proof, a taste in science includes also the ability using beauty as a criterion to see in a simple, but integrated way what is important, often before others recognize it. I think that Bruno at least in some part learned (if it is possible to learn this at all) the sense of taste in physics from his teacher, whom he worshiped: Enrico Fermi. As Fermi, he was able to see simple, beautiful ideas, important for the future of physics. Somehow Bruno was able to know what problem is important, and even foresee a solution long before the problem was even recognized by the others...

Of course, today we all know how important is the concept of generations in particle physics, as well as the concept of lepton mixing and lepton number violation. We understood it particularly well after the discovery of neutrino oscillations. Bruno understood (or sensed, not sure how to say correctly) the main concepts related to the physics of leptons earlier than most, likely earlier than anybody. He proposed many pioneering ideas in this area, often doing pioneering experimental research himself (particularly when he was still in the West where the conditions for experimental research were better). Neutrino physics, which was at the center of his research for many years, is (only?) an important and beautiful part of this larger area of the physics of leptons. It may be a key to many problems in physics. I think the role of Bruno's ideas will only grow with time.

Bruno's scientific influence and contacts were very important for Dubna becoming an integral part of the collaborative international research in physics. In Soviet times, when Soviet physicists have been largely isolated, and Bruno himself could not travel to the West for tens of years (he had restrictions even on visiting some scientific centers in the Soviet Union), it was not simple. As an example: Bruno was very supportive of the idea of participation of my group in the DELPHI experiment at CERN. He highly recommended our group to Ugo Amaldi (Fig. 7), this was important both for the recognition of our group, and for the success of DELPHI. Ugo mentioned this in conversations with me.

I believe that due to my family history, I understand the motives of Bruno's departure in 1950 to the Soviet Union. My father lived in Lithuania before the World War II, when Lithuania was not a part of the Soviet Union. My father was a well-off medical doctor, at the same time he believed in a very idealistic way in the philosophy of communism. Similar views were quite popular among many intellectuals in the West at that time, partly as a reaction to Mussolini, Hitler, Franco and their followers. Bruno had similar views, as I know he was deeply influenced by the civil war in Spain in 1930s, and my father went as a volunteer in international brigades to this war. We discussed it with Bruno.

Fig. 7. – Bruno Pontecorvo and Ugo Amaldi, Research Council meeting in Dubna, 1991.

Bruno's political views have evolved very seriously with time, particularly after he experienced first hand for many years the realities of life in the Soviet Union. Of course evolution of Bruno's political views was graduate. It is very difficult to change the views adopted in youth, as it is difficult to have doubts in a religion adopted in youth. Not accidentally Bruno later compared the philosophy of communism with a religion. Until the end of his life, Bruno was a democrat and believed in the principles of social justice, as he did in his youth. A mistake of his youth was that he also believed that these principles are an integral part of a society in a communist country.

Let me discuss one episode. In 1989 I was at CERN working on the DELPHI experiment, when Bruno visited CERN for the first time ever on invitation by Carlo Rubbia, then the Director General of CERN. I was practically all the time with Bruno when he visited CERN for the first time in his life, I tried to help him as much as I could, Bruno was over 75 years old and had Parkinson's disease. One day, on the request from Bruno, I drove him to visit his famous older brother, geneticist Guido, who has retired by that time and lived alone very high in the mountains in Valais in Alps. The brothers met for the first time after Bruno's departure to the Soviet Union almost 40 years earlier.

I remember how Bruno and I stepped out of our car after arrival to Guido's lonely chalet high in Alps. The last village on our way was left far behind. "Look how beautiful it is here" exclaimed Guido after first greetings. I looked around: we were above the forests, not far from the snow line. The first thing I saw when I looked around were beautiful mountains. It was a fantastic view: the air was clean and crisp, and I felt dizzy at such a high altitude. I think I stepped on small alpine flowers growing under my feet, not even noticing them at first. There were many alpine flowers under our feet, it turned out that these flowers were the most important things around! Guido later explained that, although he was known as a geneticist, his true love all his life was botany. An avid mountain climber in his youth, he collected seeds of different alpine flowers from many mountains around the world, and he dreamed to built after retirement a home high in the mountains, plant all these flowers around him and enjoy... this is exactly what he did. Guido later told me that in the 1930s he had a chance to add to his collection the seeds of alpine flowers from the mountains in the Kazakhstan area of the Soviet Union. He

was invited to Chair a genetics conference organized in the city Alma-Ata in Kazakhstan in the Soviet Union, close to the mountains. So he asked in his visa application to the Soviet embassy for a permission to extend his trip after the conference and spend some time in the mountains, collecting seeds of the flowers. This extension of his trip was refused by the Soviet authorities for reasons which have not been even explained in an understandable way. Guido felt deeply offended and refused to go to the conference, and he decided not to go to the Soviet Union while such restrictions for visitors are in place... His views of the Soviet Union became very negative, and very different from the views of Bruno. I remember the first conversation of the Pontecorvo brothers after the first greetings, and after we installed at the table with simple food prepared by Guido, and raised our glasses with wine (see a picture I took at that moment, Fig. 8).

Fig. 8. – 1989 Guido (left) and Bruno Pontecorvo: Immediately after they met after nearly 40 years (I took the picture).

Fig. 9. – Bruno Pontecorvo (right) and Jack Steinberger in 1989.

This was the first meeting of the brothers after 40 years.

Guido: "And how are you there?" (meaning in the Soviet Union)

Bruno gestured not really approvingly.

Guido: "I told you so!"

It was like if they continued a conversation which started 40 years ago; it was clear that political views were different. It was also clear who was the older brother...

And one more picture Fig. 9, taken from my camera during the first visit of Bruno Pontecorvo to CERN in 1989: the first meeting of Bruno Pontecorvo (right) and Jack Steinberger in 1989 after so many years. Jack introduced Bruno to a packed audience at a CERN seminar, Bruno spoke at this seminar about their common mentor: Enrico Fermi.