

Few Memories of Yakov Zeldovich

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1. Yakov Zeldovich and Odessa (by Nikolai Kh. Kopyt)

I first met Yakov Borisovich Zeldovich in 1976, however, our closer acquaintance took place in 1977, when I made a report on metallized fuels burning at the Academic Council meeting on Combustion sciences of the Academy of Sciences of the USSR (it was Valerian Aleksandrovich Fedoseev, see Fig. 1, who was the councilor, but for health reasons he could not go on business trips, and this mission was entrusted to me). I was asked quite a lot of questions, and a scientific dispute arose between me and the Leningrad group of scientists led by Professor Ozerov. Yakov Borisovich stood up; there was a row of tables in front of the first line of chairs, and instead of walking around them he jumped over the table, leaning on the desk with one hand. Coming up to the blackboard, he quickly wrote down few equations and having solved them, he put an end to our dispute. He noted then, that he had solved these equations earlier, but had never published them.

There was an All-Union symposium on physics of combustion and explosion in Odessa in 1978. As I was the chairman of the administrative and technical commission of the Odessa group, organizing this symposium, it was me who was assigned to meet Yakov Borisovich in the airport. When we got into the car, he asked me about my research in the field of metal combustion. I answered that on the Council meeting I had reported the works of the thermal physics department, while I dealt with the problems of inflammation, combustion and detonation of the large-scale liquid-drop systems. Yakov Borisovich was interested very much and we were discussing experimental results of my group all the way long. He asked me whether I was familiar with the works of Borisov, Gelfand, Frolov and some other scientists of the Chemical Physics Institute of the Academy of Sciences of the USSR, and the works of foreign authors as well. When we arrived in the Black Sea Hotel, I told him that I had been also studying foam detonation and that my colleagues and I had developed a number of foam generators, protected by the inventor's certificates. When we entered Yakov Borisovich's suite, he said that if he had known that they would be met in Odessa this way, he would have taken his girls with him.

In the morning I picked up Yakov Borisovich and we went to the symposium meeting, where he had an active position. Before lunch Professor V.A. Fedoseev called me. There was the head of the theoretical physics department, Professor Iosif Zalmanovich Fisher in his office. Valerian Aleksandrovich asked me if I could introduce Iosif Zalmanovich to Academician Zeldovich. I answered that I would try. It was already next to last morning report when I told Yakov Borisovich that there was quite a famous theoretical physicist in our University, whose book «Statistical Theory of Fluids» had been translated into English and published in the USA, who wanted to talk to him. Yakov Borisovich smiled and said

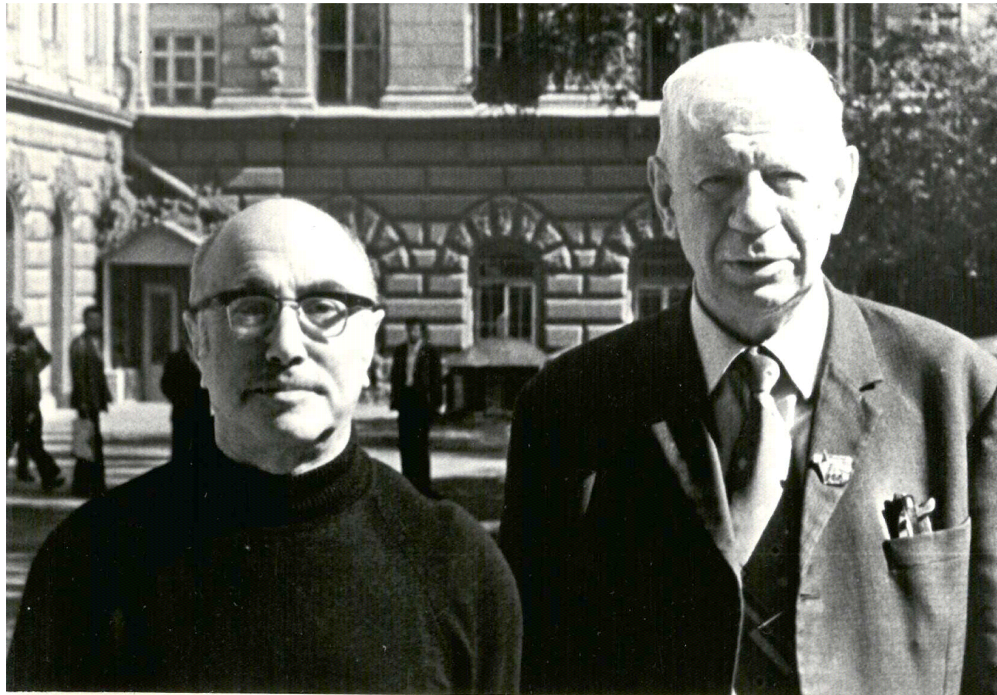


FIG. 1. Yakov Zeldovich and Valerian Fedoseev (year 1978). Physics Institute of the Odessa I. I. Mechnikov national university is on the background of the photo.

that all the profound talks usually took place at dinner. I retold those words to Professor Fisher, and he answered that in such a case we would invite Yakov Borisovich to the Londonskaya Hotel restaurant. After the end of the morning meeting I came up to Academician Zeldovich and told him that we were invited to the restaurant. Yakov Borisovich said: «Oh but I was joking». But I answered: “Yakov Borisovich, you have already had breakfast, and I have not eaten anything since 7 a.m.”. “Well, let’s go to the restaurant then”, answered Academician Zeldovich. In the restaurant Yakov Borisovich asked me if I would drink cognac. I answered in the affirmative. Iosif Zalmanovich came with the Associate Professor Salistra. “Cognac for guys then and a glass of red wine for me, please”, said Yakov Borisovich. We enjoyed our dinner time. In addition to questions on scientific topics, Yakov Borisovich was interested in Odessa anecdotes, which he liked, and he even remarked that Odessa ranks first in the issues of humour in the USSR. After dinner we walked to the University and Yakov Borisovich went to the evening symposium meeting. In the evening we went on a short car tour of Odessa. When asked whether the reports at the symposium were interesting, Academician Zeldovich said that a couple of reports had been substantial, but the other reports contained either approximative solutions, or old problems. Next morning Yakov Borisovich left for Moscow.

It was 1984 when in the Chemical Physics Institute of the Academy of Sciences of the USSR they were celebrating jubilees of Academicians Yuliy Borisovich Khariton and Yakov Borisovich Zeldovich. By the right of seniority, Academician Khariton was the first to be given the floor. He told about the first steps of Yakov Borisovich in science and about his PhD exams in 1934. At that time exams used to last all day long. Zeldovich had shown his talent and got a high mark. Yakov Borisovich, who was sitting in front, quickly jumped to his feet and held three fingers up. Yuliy Borisovich said: “Do not downplay your achievements, Yakov Borisovich. You have got a solid “four”, or, as they say now, “four

with the plus”” (in five level mark estimation scheme).

2. Zeldovich in Slovenia (by Andrej Čadež)

Astrophysics was introduced in Slovenia by drafting a relativist and field theoretician to do the job. This was a particularly difficult task for a person with no background in astronomy. In fact, the task would have been impossible without the excellent book “Relativistic astrophysics” by Zeldovich and Novikov (in edition of Thorne and Arnett), which represented an invaluable bridge from the formal mathematical environment of field theory and Einstein’s theory of gravitation into the vivid and exciting world of astrophysics encompassing cosmology, galaxies, black holes, stars and all other physical paraphernalia that are needed in order to even start building an understanding of the universe we live in.

3. Yakov Zeldovich in Hungary (by Péter Lévai)

Ya. B. Zeldovich went abroad from the Soviet Union for the first time in 1966, when he was invited by George Marx to visit Hungary [1] Since then he visited Hungary several times, participating in the biannual Neutrino Conferences, organized by G. Marx and attended by R. Davis, C. Cowan, F. Reines, V.L. Telegdi, B. Pontecorvo, T.D. Lee, V.F. Weiskopf, and R.P. Feynman among others at the lake Balaton [2], see Fig. 2. In the numerous discussions with Hungarian colleagues Zeldovich had given many useful advices which laid the basis of modern astroparticle physics research at the Eotvos University in Budapest.



FIG. 2. Conference Photo of the Neutrino’75 conference in Balatonfüred. In the center Yakov Borisovich Zeldovich can be seen. At the right edge: Carlo Rubbia and George Marx.

It has been written [2] “During frequent visits from the second half of the sixties Zeldovich gave many seminars in Budapest and presented also difficult problems to solve to young students. Alexander S. Szalay (member of the Hungarian Academy of Sciences, now at Johns Hopkins University, Baltimore)

has made the first detailed analysis of the astrophysical bound on neutrino mass in his Ph.D. dissertation written in 1975 under the supervision of G. Marx; following ideas of Gershtein and Zeldovich.

In a subsequent series of papers Marx and Szalay have developed the ideas on the role massive neutrinos might have played in galaxy formation via their density fluctuations resulting in Jeans-type instabilities.”

Ya. B. Zeldovich loved to visit Hungary. Even the last meeting he participated abroad was also in Hungary, the 99th Colloquium of the International Astronomical Union held in Balaton on June 22-27, 1987. Zeldovich was known for his extreme variety of scientific interests. It is not surprising that his last talk was entitled: “ The right-left asymmetry in biology”, see [3]. In that talk he discussed deep connections between the asymmetry in particle physics (parity violation), in atomic and molecular physics (polarization and polymerization), and the origin of life. Markedly, few months before he passed away Zeldovich wrote: “Too small is our knowledge concerning of the real chemistry of the birth of the life. The best one can do now is to enumerate various possible scenarios. The ultimate solution of the problem of the origin of life and of biochirality will be given hopefully in the year 2000. This is my prognosis and nobody will be more glad, than myself if this prognosis will be wrong and the answer will be given earlier”. This optimistic prognosis was given by the very optimistic person, who certainly was Yakov Borisovich Zeldovich.

References

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- [2] András Patkys, Hungarians explore the early Universe, *Fizikai Szemle* 1999/5. 214.
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