

REMINISCENCES OF THE PREHISTORY AND EARLY HISTORY OF THEORETICAL PHYSICS IN POST-WAR KRAKÓW*

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Well, first things first. I thank Professor Marek Jeżabek, the originator of this session, the organisers, and all the speakers for providing glimpses into the present state of the fields of physics I have always been interested in. Last but not least, I would like to thank you for all the quotations and addresses about me or to me. Such things are nice to hear, even if you are not quite convinced that they are merited.

As the subject of my talk, I have chosen the prehistory and very early history of theoretical physics in Kraków, as seen from my trajectory.

Going far back in time, I remember the years when it was impossible to get an M.A. in theoretical physics in Kraków. The system of studies of that time was called 3 plus 2. This means that after three years, you were getting a diploma in physics, which was good enough to get a job as a physicist. Alternatively, you could study for two more years and get an M.A.

In Kraków, it was possible to get an M.A. in experimental physics, but people who wanted to get an M.A. in theoretical physics went to Warsaw. The reason was simple. In Kraków, we did not have enough teachers of theoretical physics. At the Jagiellonian University, there was a full professor of theoretical physics, Professor Jan Weyssenhoff, a very remarkable person. He had great merits for the physics in Kraków, but he had only one assistant professor. These two people were the core of the theory group in Kraków.

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They made efforts to get some assistants, but this was not easy in the situation, when there was no local production of theorists. In the year 1956, which is very important for the story I am telling you, there were just two assistants. The professors were giving all the lectures on theoretical physics. The older of the two assistants, Ms. Antonina Kowalska, who had also studied mathematics, gave for my class, this is the class which started in the year 1952 and graduated in the year 1956, a one-semester course on algebra, while the younger assistant gave no lecture courses. With this team, it must have been very difficult to organise the lectures in theoretical physics needed for the experimentalists. Adding on top of that, a two-year course in theoretical physics must have been next to impossible and was not attempted.

Fortunately for the theoretical physics in Kraków, this 3 plus 2 system was very strongly criticised by the university lecturers. Their observation was that at the upper, the two-year course, they had to spend most of their time reminding students about things they had learned and forgotten, or learned wrongly, during the three-year course. The criticism was so strong and from so many sides that the system got changed. The students who began their study of physics in 1951 had a four-year course with an M.A. for everybody at the end. After two years, this was extended to five years with an M.A. at the end, as we have it now.

This change was a headache for the theorists in Kraków. What to do with people who want to get M.A. in theoretical physics? My year was the first when this problem arose. Five of us wanted to get M.A. in theoretical physics. After much deliberation, Professor Weyssenhoff decided that it shall be possible to get an M.A. in theoretical physics in Kraków. And this decision, taken in the year 1955, was a breakthrough. Or, if you prefer the physical terminology, it was a phase transition. The number of young theoretical physicists on the job market in Kraków jumped from almost zero to several every year. Of course, not all of these people went into research. For instance, some became high school teachers. The number of researchers, however, was also increasing by several every year because there were openings at the university, in this institute, and in other places. For instance, I became an assistant in the theoretical chemistry group, as mentioned by Karol Życzkowski.

The number of young theorists was increasing, but their situation would be considered very awkward by the present Ph.D. students. We were more or less at the level of today's Ph.D. students, but the more experienced theorists did not produce problems suitable for beginners. I mean problems sufficiently easy that we could solve them and sufficiently interesting that the solutions would be accepted for publication in respectable journals. Thus, each of us was trying on his own to find a problem that he could handle and which would turn out to be interesting. One could claim that this is

the best way of training theorists, but it certainly has some defects. Firstly, it is a very slow process. And secondly, the choice of problems, especially at the beginning, had a very large random component depending on what paper we accidentally found.

Fortunately, we knew each other, we talked to each other, and at some point, a group among us decided that it would be helpful if we were better educated. For instance, during our studies at the university, we had no quantum field theory at all. Thus, we organised a seminar, a completely private enterprise, with no senior teachers involved. We were meeting once a week, in the conference room of the theoretical chemistry group where I was working, and we taught each other quantum field theory. We worked through the textbook by Bethe¹. After exhausting Bethe, we switched to a textbook by Thirring². Surely, we learned quite a few things, but this did not result in a flood of papers with our names on them.

However, it caused something that was also very important. It tightened the bonds among us. We were now talking to each other a lot. We were meeting not only at the university, but also in cafes, at birthday parties, and so on. And then in 1960, we made the next step. This was organising a summer school, which later got known as the First Kraków Summer School of Theoretical Physics. This school was a great success. So much, so that if I were asked when the prehistory of theoretical physics in post-war Krakow ends and the history begins, I would suggest the year 1960. Firstly, the School passed the test of time. Schools, like the first one, were organised year after year. The next one planned for this summer is the 65th, I think. Secondly, the school proved to be very popular.

We had lots of visitors, both students and lecturers. Already, the second school was visited by Professor Robert Marshak, co-discoverer of the V–A coupling, which is one of the building blocks of the electroweak theory. But this school also exhibited a weakness of our group.

We were eighth, I think, at this school, though not everybody was giving a talk. There were no two talks that would be on related subjects. We had a talk about superconductivity, another one about general relativity, another one about how to use a computer, a very interesting, exotic problem at that time, another one on dispersion relations, others on low-energy nuclear physics, and cosmic rays. Obviously, it would have been very difficult to get two or more of us to collaborate on a problem of common interest.

Fortunately, two more developments came that compensated for this defect. We discovered a group led by Professor Marian Mięslowicz at the Academy of Mining and Metallurgy, now the AGH University of Krakow. This group was working on cosmic rays of the highest energies then observed.

¹ S.S. Schweber, H.A. Bethe, F. de Hoffmann, «Mesons and Fields».

² W.E. Thirring, «Principles of Quantum Electrodynamics».

Professor Mięslowicz was an experimentalist, a very good experimentalist, but he had a weak spot for theorists. So, we were always welcome there. We began attending his seminars regularly, listening, taking part in discussions, occasionally reporting on something, and we liked it very much. So much, so that we concentrated on what is now called particle physics.

Almost simultaneously, another development took place.

Somehow, it became much easier for young theorists to go to Western laboratories to practice there, typically for a year or a year and a half. Of course, for us, CERN was the first choice, but in other places, people also learned a lot. Then evolution accelerated. Other groups, I did not mention, either appeared or became more visible. And after about half a century, we got to the stage that we have now.

Thank you.