

**After dinner talk at the “Joint ESS ILL User Meeting” at Lund/Sweden in the evening of 6 October 2022 by Bruno Dorner.**

Prof. Heinz Maier-Leibnitz was Professor at the „Technische Hochschule „ (now „Technische Universität“) in Munich. The first Research Reactor in Germany „The Atomic Egg“ was built about 1958 in Garching near München and was attached to the institute of Prof. Maier-Leibnitz.

Prof. Maier-Leibnitz was the first director of the Institut Laue-Langevin, founded in 1967 in Grenoble, until 1972. The French co-director was Prof. Bernard Jacrot. Prof. Maier-Leibnitz participated already in the preparatory negotiations between France and Germany. There he insisted, that the new High-Flux Reactor will be dedicated to scientific research without industrial activity, like isotope production. Second he insisted to open the new institute for international users. Having visited other neutron research centers, he was convinced, that these centers were under staffed in comparison to their instrumental facilities. At the time he thought about 30 scientists on site and about 100 visitors. Here to say: a few years after the start of experimental activity at ILL there were about 50 instrument responsables (local contacts) at ILL and about 1500 visits per year. Several users coming several times per year. Prof. Maier-Leibnitz insisted also, that the travel expenses for users will be payed by ILL.

Being director he decided to build the 100 m long neutron-guide hall, although the reflectivity of Ni plated mirror-glass plates was not known. He was personally convinced, that the reflectivity will be high enough. Finally Daniel Cribier and Bernard Jacrot measured the reflectivity in Saclay to be 99 %. And everybody was happy!

I myself came across the first neutron-guide in 1962, when I started my thesis work at the Garching reactor. At the time nobody dreamed about a neutron guide. It was a copper tube about 3 cm diameter and several m long. The tube led from the reactor to the experimental station and was evacuated, to reduce losses by air scattering. The scientists at the measuring station were surprised to get more neutrons than expected. Finally, it was Tasso Springer, who found the explanation: Total reflection inside the copper tube!

The neutron-guides at ILL and the attached instruments, particularly the cold neutron-guides, contributed much to the reputation and success of ILL!

The introduction of central services by Prof. Maier-Leibnitz was a great success. Equipment for low and high temperatures, high pressure, high magnetic fields, electronics, computing for instrument control and for science, etc. was provided by specialized groups. These groups also developed new equipment.

Prof. Maier-Leibnitz tried to think ahead of time and helped to find a realistic way to run large facilities in Solid State physics.

In such thoughts he was not fond of “classical instruments” like three-axis spectrometers. Therefore the three-axis spectrometer “IN2” needed to be special and got a double-monochromator, to reduce background, to reduce higher-order reflections and to allow for large monochromator angles. It was built by Georg Duesing, with some help by me from the Jülich Research Centre, where I was employed.

In fall 1972 the three-axis spectrometer IN2 got ready for real experiments. Michael Steiner and myself measured magnons in CsNiF<sub>3</sub>. It was published as: “Spin Wave Measurements in the One-Dimensional Ferromagnet CsNiF<sub>3</sub>” in Solid State Com. 12, 537 (1973)

The manuscript was already accepted on 20 December 1972. It was the first publication of experimental results at ILL. In preparing the experiment I had calculated the resolution, one of my hobbies. It means calculating the slope of the resolution ellipsoid at various positions in reciprocal space to be compared with the slope of the magnon dispersion curve. Prof Hans Dachs from Tübingen, the thesis supervisor of Michael Steiner, was present at the instrument, when we started the experiment. During the first scan his nose turned white by attention – and we did not observe a magnon signal – eventually one point a bit higher than background. In the next attempt we reduced the instrumental step width considerably and there was the magnon. Apparently the slope of the resolution ellipsoid fitted extremely well to the slope of the magnon dispersion curve. Michael Steiner became later Director of the Hahn-Meitner Institut in Berlin.

The very large monochromator angles on IN2 were rarely used. One example was the experiment on deuterated methane, CD<sub>4</sub>, at low temperature: “Critical Slowing Down of Orientational Fluctuations in a Plastic Crystal” by W. Press, A.Hüller, H. Stiller, W. Stirling and R. Currat; PRL 32/24, 1354, (1974). To reach the position in reciprocal space,  $Q = 3.18 \text{ \AA}^{-1}$ , where the critical scattering could be best observed, a relative large incoming energy,  $E_i = 13.7 \text{ meV}$  was necessary. At the same time very high energy resolution was required.

With two Cu (220) monochromator crystals and a Cu(220) analyzer crystal and Bragg-angles of  $2\theta = 146^\circ$  a resolution of 0.104 meV (better than 1%) could be obtained. The smallest measured width of the critical scattering was 0.015

meV near the phase transition temperature, corresponding to a relaxation time as long as  $2.4 \cdot 10^{-10}$  sec.

Besides the scientific success there was another rare event: Werner Press had grown a large single crystal of  $CD_4$  at low temperature in his home institute in Jülich. The German Bundeswehr agreed to transport the cryostat with the crystal by helicopter to the ILL. Two stops on the way were necessary to refuel the helicopter and to refuel the cryostat. So Werner Press got military help for his science, remarkable. Later Werner Press became Professor at Kiel University and again later German Co-Director of ILL.

During the directorship of Prof. Maier-Leibnitz all scientist were employed on time limited five-years contracts. This changed with the arrival of Prof. Rudolf Mößbauer, Nobel-Price winner, as second director of ILL in March 1972. He introduced the title “staff scientist” with permanent contracts. Finally about 50% of the scientists at ILL were on permanent contracts.

Prof. Maier-Leibnitz went back to his home institute in München. Soon after he became President of the “Deutsche Forschungsgemeinschaft”

Now a more private story: July 1972, my family, Stilla, the mother of our two girls, 4 and 7 years old and myself had rented a chalet for one month in “Lans en Vercors”. I had come to work at ILL, to get the Three-Axis instrument IN2 ready to operate. Prof. Rudolf Mößbauer was the new director of ILL. During our stay, Prof. Maier-Leibnitz came to visit the ILL. I knew both of them sufficiently well, that I dared to invite them both for dinner into our chalet. Here I must say, that I knew, that the relation between the two was not perfect. Prof. Maier-Leibnitz had been the thesis supervisor of Prof. Mößbauer, who obtained the Nobel-Price for his thesis. During the thesis work the two had different opinions about, how to proceed. Finally Mößbauer published without Maier-Leibnitz and obtained the Nobel-Price alone.

Well, they both came. Our girls, already in pyjamas, were allowed to say good evening before going to bed. After a glass of aperitif we sat down on the dinner table and Stilla brought in a salad-bowl. She had turned the salad a few times on the table, when Prof. Maier-Leibnitz, who was a Hobby-Cook, said: “Madame Dorner, you must know, a good salad has to be turned a 100 times”. Stilla looked at him and replied: “Prof. Maier-Leibnitz, perhaps you missed it, but over in the kitchen corner, I have turned the salad already 97 times”. – Silence – Silence – felt as for minutes – Then Prof. Maier-Leibnitz burst into a whole-hearted laughter!! And we spent a really relaxed evening. A month later, Prof. Mößbauer asked me to send my papers to become “Senior scientist” at ILL.

In later years the ILL introduced a program for physics students in their third year of study. They could come to the ILL in the lecture free time, two months in spring or three months in fall. They got some money for living from ILL and accommodation at the campus of the Grenoble University. I had regularly students from Regensburg and from Munich.

In 1986 Helmut Schober came from Regensburg. Now he is known as former director of ILL and as current director of ESS. I cared for these students not only scientifically at ILL, but also I took them to mountain hikes. We were three students about 25 years old and me about 50, who left Grenoble one day in late summer at dark early in the morning. Helmut was with us. We wanted to go to the “Croix de Belledonne”, 2.926 m high, near Grenoble. This is the second highest pic, the highest being the “Grand Pic de Belledonne”, 2.977 m high, but difficult to climb up. We parked my car at about 1.400 m height and started walking up the more than 1.500 m difference in height. I knew, that below the summit there is a snow-field to walk up. Therefore I carried my icepick attached to my rucksack. After about half the way up, Helmut wished to carry the icepick in his hand, ok. He was in good mood and always some 100 m ahead of the rest of us. We reached the snow-field at about 11 o'clock in full sunshine. The surface was soft and we could easily walk up with our mountain boots and without icepick. Helmut with the icepick was first on the summit of “Croix de Belledonne”. The tall man, full of joy, waved the icepick high over his head to become even taller. As I could see, he was above many things – so he was above the Grand Pic de Belledonne and also higher than 3.000 m. Then finally I understood, why he had asked to carry the icepick.

Dear Helmut,

You had respect to the mountains. At the same time you always carried your head upright. My compliments to your success!