

The Origins of the Institut Laue Langevin, Grenoble

Presentation by Denis Guthleben, Historian, at the 50th Anniversary Celebrations of the founding of the ILL, 19 January 2017

Ladies and Gentlemen, dear colleagues and friends, it is a very dangerous exercise to trace the path of an institution in front of those who have participated in its history, and who continue to live it ... even more so when this story has all the scientific and human wealth that is the Institut Laue Langevin, and where the organisers have only agreed to give one twenty minutes to do so.

Nonetheless I will pursue the profession of the historian and I will devote these 20 minutes to the sources on which I could rely to prepare this presentation; firstly the witnesses who agreed to answer my questions, and I thank you all for your time. I would also like to take this opportunity to express a thought for an eyewitness who has recently passed away, Bernard Jacrot, author of the unique book entitled *Des neutrons pour la science*. Finally, there are the actual archives. Much to the regret of the people who guided me through the corridors of the ILL, few documents have been retained on the site. Don't fret, this is a general situation in our laboratories, you have not been more careless than most of our colleagues ... As I have often heard, it has the practical merit, of avoiding the risk of exposing skeletons in cupboards!

However historians do not lack resources; what they do not find locally, they can often find elsewhere ... Under the number 19-78-03-05-26, our national archives contain a multitude of documents on the origins of the ILL. And it is to this period that I propose to return, because they shed light on the creation of this exceptional institute. This genesis leads us first of all into the field of international, scientific connections, certainly, but also political relations, between the two countries at the origin of the project: Germany and France. We have nearly forgotten that the close ties that unite them today in the field of research, is a recent achievement, arising from the time of, and around the establishment of the ILL.

After 1945, excluding the collaboration arising within the special activities of CERN, Franco-German scientific contacts remained close to zero for a long time. The explanation lies in the consequences of the war. As early as 1946, the head of the scientific mission that France maintained in its zone of occupation in Germany gave his viewpoint in a note. Here is the recommendation he sent to the government and to the heads of research institutions, including the CNRS and the CEA, which will later be involved in the beginnings of the ILL:

"We must not let ourselves be won over by the hype that the Germans are making around their people and their work [...] Our policy towards German scientists must be to extract as much information as possible about the new ideas they had, the results they have achieved, and the methods that have enabled them to achieve these results. Think of them as milk-cows that we will abandon after having milked them."

The tone is thus set in the aftermath of the Second World War, and it will vary little thereafter. In the late 1950s, France signed scientific agreements with most European countries, on both sides of the iron curtain including the Academy of Sciences of the Soviet Union, but with the notable exception of the two Germanys. Yet during the time, from the signing of the Treaty of Paris in 1951 to that of the Treaties of Rome in 1957, the lines shifted, and the FRG made its return to the arena of nations ... but the scientists, it seems, very paradoxically, held on to their grudge more tenaciously than the others!

Another treaty, new scientific opportunities, and a different context would help lift this blockage in the next decade. In January 1963 General de Gaulle and Chancellor Adenauer signed the Treaty of the Elysée in Paris. This recommended, amongst other matters, the strengthening of "cooperation in scientific matters" in somewhat vague terms: "Research organizations will develop their contacts by starting with more in-depth information sharing, and joint research programs will be established in the disciplines where this be possible"

The scientific opportunities, first of all, came mainly in the context of international competition, and in particular transatlantic competition. Since the end of the 1950s, Europeans learned that the United States was preparing to build a reactor at Brookhaven, producing the most intense neutron source in the world. This offered a decisive advantage to research in what is called "solid state physics", and more widely, the "physics of condensed matter", but also to all the areas likely to use such equipment in America, such as those of the life sciences.

Already, on the old continent, several scientists had begun to react. Lew Kowarski, the former colleague of Frédéric Joliot-Curie, who had joined CERN, was the first to alert his colleagues as early as April 1961. He released a report on, I quote his title, "The new trends in atomic research and their international significance", where he clearly mentions the desirability of building a high-flux neutron reactor in Europe. This perspective fell within the framework of the OECD and could be based on a project already under consideration in Harwell, not far from Oxford, in Great Britain. The case seemed all the better in that our British friends were then very eager to share the costs of building their own reactor ... until London announced they did not want to put a single penny into this European project, which then sank like a stone!

The torch was then taken up on the French side by the CEA, around Jules Horowitz and Robert Dautray. The latter left an illuminating testimony in his *Mémoires* on the way in which the project evolved. However one aspect remains in the shadows. Despite the notes of Dautray and Jacrot, and finally in all the documents where you asked me to research as far as possible, dear Helmut Schober, and that is the choice of Grenoble. The testimonies and the archives are silent on this subject, to the point that it is difficult to find this decision. Many items show the infrastructure which was set up within the perimeter of Grenoble, around personalities of Louis Néel, Louis Weil, Felix Bertaut, and Albert Lacaze, whose collective dynamism we know, and even the passion they lent to defend the interests of the capital of Dauphine.

Hardly had the British withdrawal been announced when Néel and Bertaut decided to organize a symposium on neutron diffraction and scattering, which brought together all the experts of the field to Grenoble in September 1963. The meeting was a milestone, with 10 working sessions, 49 memoranda and a publication of the results in bilingual documents produced by the CNRS. It also reaffirmed the scientific vitality of Grenoble, the quality of its researchers, as well as its title of city as "father of magnetic structures". Finally, it led to a first contact that would be important later. On the sidelines of the symposium, in Grenoble, then in Munich, which he visited as the new president of the International Union of Physics, Louis Néel created a close relationship with Hans Maier-Leibnitz. Maier-Leibnitz, greatly prestigious across the Rhine, was not only a fervent supporter of the creation of a high-flux reactor, he was also a strong supporter of the Franco-German rapprochement ... and could well envisage the construction of the Grenoble reactor, for which he could well appreciate the potential importance!

At the beginning of September 1964 the third international conference for the peaceful use of nuclear energy took place in Geneva. Louis Néel and Hans Maier-Leibnitz participated there in the drafting of a project on "a reactor with high flux and beamtube outlets". At this time, Louis Weil, Albert Lacaze, and a young Paul Ageron made definitive contributions. Such a reactor needed a powerful cold source. They presented themselves as the guarantors of the Grenoble know-how in this field. Amongst the participants, Jules Horowitz, at the CEA, knew how valuable their work had been for the Saclay EL3 reactor. He also knew of Néel's persistence.

All the pieces seem to be in place on the chess board when Maier-Leibnitz came to find him with the agreement of the Federal Minister of Research, Hans Lenz, advising him of the support that the FRG would bring to the project... In short, to install the reactor, there had to be a site where the two major French organizations, CNRS and CEA, cooperated closely ... without doubt Grenoble, around Néel. He was head of both the electrostatic laboratory and metal physics of the CNRS, and the Grenoble Nuclear Research Centre of the CEA. It also required experience in the field of neutron diffraction ... Grenoble, with Bertaut and his team! And the honed skills in the field of low temperatures ... Grenoble, with Louis Weil and Albert Lacaze! Added to these scientific considerations, the human factors were just as important, such as the synergy that was created between the architects of the ILL, Horowitz, Maier-Leibnitz, Néel, and Bertaut.

Finally, these times were quite conducive to this project. On the one hand, the Elysée regretted that the agreement that was signed in January 1963 had led to few achievements in the scientific field. On the other, considerable means could be mobilized to enable it to succeed. I have not studied the research budgets on the other side of the Rhine, but I know that, on this side, there had been an unprecedented progression since 1958 and after the return to power of General de Gaulle. In these circumstances, those of you who have read Bernard Jacrot's account, will understand better his confidence on the outcome of the Geneva conference in 1964. "It was not known if such a source would cost 50 or 500 million Francs, but the ministers declared that it was not necessary to dwell on this detail and that all would be well."

Throughout the years 1965 and 1966 preparatory meetings followed one after another, on both sides of the Rhine. The archives allow us to follow the progress step by step. The two most hotly debated topics throughout this period, or even beyond, related firstly to the choice between light and heavy water - H₂O and D₂O are formulae that flooded the documents. Then there was the question of the pressure ... but not the pressure of the coolant, the fiscal pressure: it took several months of negotiations to find a solution to the problem of the inclusion of taxes in the costs of construction and operation of the reactor, which would result in a levy from the French State on the German State, which the Germans did not want to hear about ...

In comparison, there was little debate on other subjects. I can quote a confidential document of Foreign Affairs since the prescriptive limit of 50 years has now recently passed. The outcome of a meeting held on 20 July 1966 in Bad-Godesberg, the French representatives of Foreign Affairs for the CEA and CNRS, while lamenting "the slowness of our German interlocutors who always spent more than half of the time devoted to meetings in internal discussions", congratulated themselves on having obtained that the Director would be a German, but the Institute would be in Grenoble, France with a French Assistant Director.

A very beautiful prize for French diplomacy, and a quite durable acquisition as shown by the organisational chart of the ILL since its creation on January 19, 1967!

Thus it was on this day, that Gerhard Stoltenberg for Germany and Alain Peyrefitte for France signed the convention which gave birth to an Institute that its founders proposed to name after two scientists who were not only committed to the advancement of knowledge, but also, and this is the symbol of the ILL, for peace and rejection of all forms of intolerance.

This date of January 19, 1967 concluded the genesis of the ILL, and opened its true history, of which I will obviously not speak, except to add that a new partner would soon join this adventure, a partner who had been forced to forfeit its presence in the early 1960s but who was able to rejoin the bandwagon at the dawn of the following decade. On the 6th November 1970, the ILL welcomed a delegation from the UK Science Policy Council, and negotiations were undertaken which were encouraging from the start. As early as November 12, the French Ministers for Foreign Affairs and Research received a message from our ambassador in London, Geoffroy Chodron de Courcel, which indicated to them and I quote: "It is clear that the Research authorities in Britain regret having withdrawn from the reactor project, and are ready to make an effort to allow their teams access to its use." An access encouraged from the start by the new Secretary of State for Education and Science in London, which displayed very pro-European positions (Margaret Thatcher!).

Subsequently, other countries would join these three partners. But I would like to come back to one of the terms I used a few moments ago: it is the symbol. The names of Laue and Langevin are not the only ones to strike us: there is also the name of the road along which the ILL is installed. To see such an ambitious Franco-German project succeed, live, and prosper along an Avenue of the Martyrs, in a city like Grenoble which was one of the capitals of the Resistance is a vector of a reconciliation and partnership that has grown from strength to strength. This is surely another symbol that deserves attention.

It shows that science and its history have lessons for us but not idyllic and infallible teachings. We have seen how, in the scientific field, reconciliation has not been easy, and even that it has been more difficult than in other areas. But from the moment when two hereditary enemies, who had been fighting each other for a century, chose to replace their bellicose bombardments with peaceful neutron bombardments, a new era opened up in their relations, an era which gradually extended to a host of fields, and where the history of the ILL, from 50 years ago to today, provides an exemplary illustration.

Version 31 March 2018, Ron Ghosh, Epsom