

# SPG MITTEILUNGEN

# COMMUNICATIONS DE LA SSP

## AUSZUG - EXTRAIT

**Physics Anecdotes (21)**

**The Dublin-Zürich Connection**

*Norbert Straumann*

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## Physics Anecdotes (21)

The SPS did organize together with SCNAT a special symposium on 21 November 2019 in Bern, celebrating the 125<sup>th</sup> birthday of Georges Lemaître (see <https://www.sps.ch/events/diverse-veranstaltungen/125th-anniversary-of-georges-lemaître/> or the review on p. 27).

When discussing organizational details of the symposium I heard from our speakers *Harry Nussbaumer* and *Norbert Straumann* that they are in close contact with another well-known Lemaître expert, *Cormac O’Raifeartaigh* from Ireland. His father *Lochlainn O’Raifeartaigh* (1933 -2000) was professor at the Dublin Institute for Advanced Study DIAS, which was founded 1940 by the Irish state president Éamon de Valera with *Erwin Schrödinger* as its first head from 1940 until 1956. And I heard that Lochlainn had close connections to Switzerland.

In the following SPS honorary member Norbert Straumann will tell us more about the fruitful scientific relations between Zürich and Dublin, with Walter Heitler and Lochlainn O’Raifeartaigh as central persons.

*B. Braunecker*

### The Dublin-Zürich Connection

*Norbert Straumann*

#### Walter Heitler in Dublin and Zürich

As background I recall that Heitler spent the years 1941-1949 at the Dublin Institute. Shortly after his arrival he became an Irish citizen. He retained this citizenship and his links with the country after he became Professor in Zürich as successor of Gregor Wentzel. His mother and his sister remained in Ireland until the end of their lives. Since Heitler’s parents were both Jewish he had lost his position in Göttingen in 1933 and had to leave Germany. He spent some time in Bristol, was interned in 1939 for a while on the Isle of Man, and then soon received from Schrödinger an offer for a permanent position at the recently created DIAS. This was actually not the beginning of the Dublin-Zürich connection.



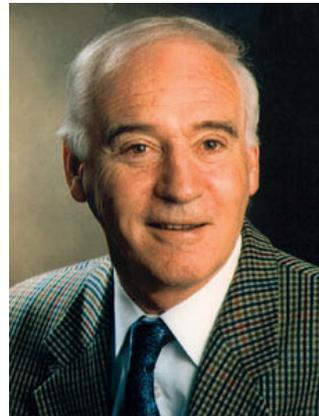
*Walter Heitler (1904-1981)*

Heitler had much interaction with Schrödinger at an early stage of his carrier. After he obtained his doctorate in Munich, Sommerfeld obtained for him a Rockefeller fellowship which he used to work with Schrödinger in Zürich, soon after the creation of wave mechanics. There he met Fritz London and the two young physicists developed the theory of the covalent bond. This happened when Heitler was 23 years old and opened him the door to Göttingen.



*Erwin Schrödinger (1887-1961)*

During his years in Dublin Heitler elaborated on his famous work on meson theory in collaboration with Hans Fröhlich and Nicolas Kemmer. For the first time he derived on the basis of isospin-invariance relations between some cross sections. But his most important work in Dublin was the theory of radiation damping and its application to cosmic ray physics. Several of his young collaborators, such as Walter Thirring, H. W. Peng, Cecile de Witt and Suraj Gupta later became international names.



*Lochlainn O’Raifeartaigh (1933-2000)*

Monday. This was at that time a gathering of the theoreticians from all over Switzerland; Stückelberg regularly came from Lausanne, and Markus Fierz from Basel. Res Jost had recently become professor at ETH and was successfully doing research on rigorous quantum field theory. I recall that he had just given his beautiful proof of a refined form of the CTP-theorem within Wightman’s framework, which showed that the CTP symmetry holds if and only if the weak locality condition is satisfied.



*ECG Stückelberg (1905-1984)*

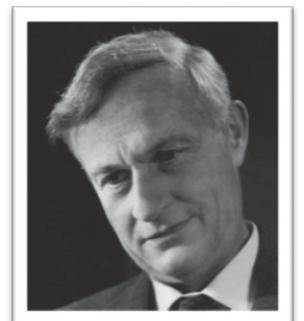
Lochlainn, which is a lot at this early age. So, I saw him mostly in the theoretical seminar, but came into close contact with him only somewhat later after I got my diploma at ETH in 1959. Jost was the supervisor of my diploma work. Although the atmosphere around him was very stimulating, with some bright young collaborators in Jost’s group (for instance David Ruelle), I wanted to work in particle physics that attracted me much more

#### ENCOUNTERS WITH LOCHLAINN O’RAIFEARTAIGH

##### Lochlainn’s Beginnings as a Scientist

In 1957, at the age of 24, Lochlainn was given a grant by DIAS to study under Walter Heitler at the University of Zürich. When Lochlainn arrived in Zürich, Pauli was still the dominant figure, and so he saw this great man in action, especially in the regular Theoretical Physics Seminar on

I was three years younger than Lochlainn, which is a lot at this early age. So, I saw him mostly in the theoretical seminar, but came into close contact with him only somewhat later after I got my diploma at ETH in 1959. Jost was the supervisor of my diploma work. Although the atmosphere around him was very stimulating, with some bright young collaborators in Jost’s group (for instance David Ruelle), I wanted to work in particle physics that attracted me much more



*Markus Fierz (1912-2006)*



Res Jost (1918-1990)

than mathematical physics. So, I joined Heitler's group at the University, where I shared the office with Lochlainn and somebody in statistical physics.

Lochlainn worked intensively with Heitler on a nonlocal field theory that Heitler and Edmond Arrous had recently proposed. This also became the subject of Lochlainn's thesis. The background of this proposal was this:

Heitler found himself rather out of sympathy with the renormalization program, in spite of its great success in QED. He considered it merely as a clever mathematical addendum to an already existing physical theory. In particular, he was concerned by the fact that it evaded the problems posed by the mass-differences of elementary particle multiplets, especially the proton-neutron mass difference. The latter was then also worked out by Lochlainn in the nonlocal theory of Arrous and Heitler. The whole enterprise was unsuccessful, but Heitler certainly addressed an important problem that remains unsolved; we have just shifted it to the quark level.

In my thesis I had to continue Lochlainn's work. Thanks to his hints and notes I quickly computed the mass difference of the pions - with no surprising result - and then that of the kaons. Heitler saw the results in a more positive light than me, but since not more than half a year had passed, he suggested that I should also do the  $\Sigma$ -hyperons in order to get my doctorate. Because I disliked in the meantime the Arrous-Heitler theory more and more, I did that also quite rapidly, hoping that I could afterwards do something more interesting. Still less than a year had passed, and so Heitler asked me to treat also the  $\Xi$ -hyperons. At that point I really got nervous and told Lochlainn that I had enough of all this nonlocal stuff with its intrinsic deceases. I never forgot Lochlainn's wise advice. He said: "Just slow down, do something else, and then Heitler will be satisfied after the year has passed". This is exactly what I did, and it worked. (Well, I did the  $\Xi$ -hyperons too.)

Heitler was, of course, very pleased with Lochlainn and tried to keep him. Not surprisingly, Lochlainn returned to DIAS in 1961 as an assistant professor. But the Dublin-Zürich-connection remained until the end of Lochlainn's life. Some members of this exchange (Andreas Wipf and Ivo Sachs) are in the audience. Unforgettable for me is the beautiful time in Dublin I spent soon after Lochlainn's return to DIAS. All of you who have worked with him know his passion for clarity and his ability to get to the essential features of a problem. He used to say that he first had to reach the stage when he could work on a problem in a bus or a tram, without using paper and pen. Above all we liked him as a human being, his kindness, honesty and simplicity. I had only few joint projects with him, but the most important was our common publication "*Gauge theory: Historical origins and some modern developments*", Rev. Mod. Phys., **72**, 1 (2000). The unique personality of Heitler was honoured by Res Jost in his obituary: *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich* (1983) 128/2: 139-141.

### Lochlainn as a Skier

Let me end with a story from a very nice week at a Winter School in Zuoz, a beautiful small town in the Engadin. This was much later in the seventies. Lochlainn had been before at a Winter School in Schladming, where he learned skiing with remarkable success. He was very eager to continue with this in the Oberengadin, a classic skiing region.

But let me first say something about his role at our school on "weak interactions and gauge theory". The audience consisted mostly of experimentalists, who were eager to understand the principles of gauge theories and their applications. The Standard Model was not yet fully established because of existing discrepancies with some experiments. Lochlainn did a great job. Quickly, the participants lost all fear to ask questions at any occasion. The interaction was really very intense. Years later people remembered this week as a very special one, during which they learned a lot. Lochlainn did everything at a relatively small blackboard, with only a few notes in his hands. He was the central figure of the school.

The afternoons were dedicated to skiing. We did quite demanding things, for instance from the Corvatsch, starting from over 3000 meters. Lochlainn enjoyed all this enormously, although he had to invest much more energy than an experienced skier. One day we went to the Diavolezza, where one has an exceptional view of the Bernina group. Lochlainn saw that some people were skiing over the Morteratsch glacier, and he asked me whether he would be able to do this too. Since he had been doing so well, I told him that this should be no problem, that skiing over the glacier is actually not so interesting, but very worthwhile because of the fantastic scenery. Initially things went fine. We crossed the main glacier, but then arrived at the top of a relatively steep slope. Lochlainn had done more demanding ones before, but now he recognized a bunch of crevasses at the bottom, some of which were quite big, emitting a bluish light. At that moment he got so scared that he was no more able to stand on his skis, after taking them off not even on his shoes. I could finally convince him to concentrate on his immediate neighborhood. Holding him, we then went step by step slowly downwards. At some point, when it became less steep, he lost all fear and we could continue on our skis. When arriving in the valley it was already darkening. Somebody from the school was eagerly waiting for us and brought us back to Zuoz.

A bit later in the evening we had our concluding banquet. Lochlainn was the obvious person to give the after-dinner speech. At the end of the successful school, the sympathy he had experienced, and the relief after the adventures of the day with a good end, Lochlainn was in a euphoric mood. He gave the best after-dinner speech I ever attended! Many years later, this time in summer, he came back to Zuoz together with his wife Trisha. In the afternoons we did some hiking. Of course, we also went to the Morteratsch glacier, over which he had been skiing years before. As you all know, Lochlainn was a keen hillwalker, so he enjoyed that too.