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RICHARD FEYNMAN'S CURIOUS LIFE

Richard Feynman, the King of Seminars

"What a wonderful life, listening to seminars and eating cookies". This was Richard Feynman's comment when the two of us happened to be the first ones to come to a seminar. I had come to Caltech in the mid 70s when Richard Feynman already was a legend. He was floating around in the department coming and going seemingly randomly, but I realised quickly that there were two events that he never missed, the seminars and the colloquia. The group seminars were always held on Tuesday and it was a high moment of the week. If both he and Murray Gell-Mann were there, there were great expectations from us younger 'spectators'. It is not clear that all speakers were as thrilled. There was no coffee but some of the graduate students had the duty to buy cookies every time. Feynman was very keen on those cookies, and the rest of us checked carefully that there was enough left for him if he was late.

The seminar room has a huge table in the middle and the senior people were sitting along it and we juniors along the walls. Feynman had a given seat — the first in the row next to the speaker — and he was fully concentrated. Those were the times of hand-written slides which were shown on a viewgraph projector. Feynman was intensively reading the slides and was always eager to know what was on the next slide. We used to say that if the answers to his questions were on the next slide it was a talk to his liking, if not the speaker was in some kind of trouble.

Some speakers tried to be very pedagogical and used a sheet of paper to cover part of the text. When we saw that, we just sat and waited for the reaction. "Do you have something to hide?" was the standard question from Feynman. Some people were checking the average time it took for the question to come, and I think it was some seven minutes.

The first seminar I listened to when I had arrived at Caltech was by Sergio Ferrara from Rome who talked about Supergravity, a very new subject at the time. Feynman was quite silent (which probably surprised the ones who knew him). The day after I was sitting with John Schwarz in his office when Feynman called. "I cannot get it to work unless the fermions are of Majorana type", he said. This was one of the new ideas behind supergravity to use Majorana spinors which is a type not used ordinarily. He had then spent the morning working out the algebra behind, which usually took people a day or more. This shows how seriously he took the seminars. He had the wish to understand everything.

In 1955, a young Murray-Gell-Mann came to Caltech to give two talks, one on the renormalisation group and one on the mysterious properties of what would become the kaons. Feynman became very excited and a bit bewildered and said, according to Gell-Mann: "I did not know these things, I thought I knew everything in particle physics. You should work here!" He then took him to the dean and said that Caltech should hire him. Two weeks later Murray Gell-Mann was a full professor at Caltech, 26 years old. Those were the days and the start of a domineering twenty years or so for the Caltech group.

The physics colloquia were also an institution that most people went to. It was Thursday afternoon and it started with tea and cookies. The colloquia were given in a rather large lecture hall which has now been very properly renamed as "Richard P. Feynman Physics Lecture Hall". Here he had his given seat in the front row and invariably it did not take long for him to start asking questions. Again it was easy for us in the back benches to understand if he liked the talk or not.

The organisers of the colloquia were of course very eager to get Feynman to give colloquia himself and at some occasions he succumbed. As careful and methodical as he was, he then chose a subject that he had been thinking of at some time and worked it through again and presented it in a new light. At one occasion he talked about Wigner's phase space distribution of a quantum state, an idea first proposed by Eugene Wigner back in the early days of quantum mechanics. So many people came to the lecture hall that the organisers had to move the talk to the much bigger auditorium. People had been coming not only from the physics department but from the greater Los Angeles area. I remember it as a most interesting talk even though this is still a subject which is not much discussed.

With both Feynman and Gell-Mann present at a seminar, the atmosphere was high strung, a bit nervous especially for the speaker and exciting for the young back benchers. The two had such different skills, with Gell-Mann the polyglot who had learnt by heart Encyclopedia Brittanica at the age of nine. (We checked him sometimes by taking a random word from there and tried to get the discussion to that subject, and invariably he said for himself the word before and the word after.) Feynman claimed he did not have any memory and said he did not need it since he wanted to derive everything from scratch. It was of course not true, but when he said it, Gell-Mann did not know how to counter. Sometimes, when Gell-Mann told a fact and repeated it in many languages, Feynman countered "Murray! It does not matter if you know the name of a bird in twenty-five languages, the important thing is to know how it functions." If they both disliked a speaker, they made him want to sink through the floor. This happened even to future Nobel laureates.

One of the first seminars I went to was given by Ken Wilson, later Nobel laureate in 1982. He had been Gell-Mann's student and as such a possible prey for Feynman. Ken Wilson was completely opposite to both of them, shy but self-confident, very quiet who spoke when he needed to. He was famous for not publishing for some seven years while he rose from assistant professor to full professor at Cornell. When he finally published he struck gold. In one work, he formulated his theory for critical phenomena in connection with phase transitions for which he got the Nobel Prize. In another, he formulated a method to solve non-Abelian gauge theories on the lattice which was a method suited to use computer methods to solve the theory. This is what he talked about at the seminar I was present at, and at some stage he said he wanted some $10 million to use for large-scale computing. Feynman did not like it and he raised and left. In the door he said, "Bye bye Wilson see you some time." Ken Wilson was stoic and just continued. My colleague Paolo Di Vecchia had come as a very young post-doc for some months to Caltech in 1969, and on the first day, he went to a seminar by Francis Low from MIT, Murray Gell-Mann's near friend and collaborator on the renormalisation group in the 1950s. The same thing happened and Feynman left the room. Low got very nervous and went after him and shouted "Dick come back, come back. I will explain..."

Both Feynman and Gell-Mann were enormously fast thinkers. In order to succeed you had to have at least a bit of the same quality. You did not need to be right all the time, but you had to follow what they said. Seminar speakers who did not follow were easy prey regardless if they were deep thinkers and future laureates.

Richard Feynman was of course famous for his lectures. Even though it sounded as if he was pulling it straight out of his head, he was very well-prepared and had thought through the material in great detail. He loved to teach students and the students loved him. He did not have a regular time that he presented his research results as far as I know. He gave seminars infrequently the time I was there. Murray Gell-Mann instead gave a two-hour lecture every week on Wednesday where he could talk about whatever he wanted. Most often it was an account of what he had worked on the previous week. This was another of the highlights of the week and people came from the universities from all over the greater Los Angeles area. If he had been out of town, he could call some of us who worked with him in the morning to tell him what we had done, and then a few hours later, he could talk about it as if he had worked on it for weeks. This is an example of the quickness they had to grasp new things.

Before working at Caltech I spent some years at European Organisation for Nuclear Research (CERN). It was a meeting point for the leading theorists (and experimentalists) around the world. Murray Gell-Mann spent a year there at the time I was there and was a frequent visitor. Richard Feynman might only have come once to give a seminar, sometime before I went there. He talked about his ideas about partons as the indivisible particles of matter (which Gell-Mann called 'puttons'). The seminar was mostly remembered since it might have been the only time he met Ernst Stueckelberg (Baron Ernst Carl Gerlach Stueckelberg von Breidenbach zu Breidenstein und Melsbach), a Swiss-German highly aristocratic theoretical physicist who had developed very similar ideas to Feynman about quantum field theory in the 1930s and early 1940s. Stueckelberg was a man with medical problems who spent a lot of his time in hospitals but when he was OK he used to come to CERN with his big dog. In the lecture rooms he used to sit with his dog in the front row having a number of pipes on the desk that he was smoking and constantly working on to get out the tobacco. During Feynman's talk at some stage he started to say something about him having done this in 1940 something. Feynman went up to him and stared him in his eyes and said "Can you not let me do one thing on my own!" The rumour does not say what happened afterwards.