56

The 1965 Schladming School and J. D. Bjorken's Recollections

The 1965 School became famous, at least among students, due to a fight between Källén and Kenneth Johnson[1] who presented their orthogonal views on the underlying nature of quantum electrodynamics. Johnson et al. [1] had found that "quantum electrodynamics may be regarded as a perfectly consistent theory" and were advocating [2] that the unrenormalized electron Green's functions are finite; the bare mass of the electron vanishes and the electron mass must be totally dynamical in origin. This irritated Källén enormously as he believed that quantum electrodynamics was not a consistent theory. From the very beginning, he was aware of the fact that his arguments were not *mathematically* stringent but they were *physically* so plausible that it was difficult to imagine how they would not be valid. After all, he was an engineer, a master of electromagnetism, and took intuitive physical arguments very seriously – far more so than ϵ's and δ's of mathematics.

The summary talk at the 1965 Schladming School was given by James D. Bjorken, who later wrote a letter to Källén, dated 17 March 1965, stating:

> "… I enclose the manuscript of my summary talk at Schladming for your blessing. I, of course, don't expect to get it, but will appreciate very much your criticisms."

Källén's answer to Bjorken (at Stanford Linear Accelerator Center), dated March 29, 1965, reads as follows:

> "Dear Björkén[2]:
>
> Thank you very much for your letter of March 17th and your Schladming manuscript. You say that you don't expect to get my 'blessing' for it and I see no reason why I should disappoint you in that respect. There are several of the things you say which I would like to have formulated rather differently, but as I don't expect you will change much anyhow, it would probably only be a vaste [read: waste] of time for me to go into details. Consequently, I shall

[1] Kenneth A. Johnson (1931–1999) was a well-known theorist at MIT.
[2] Källén insisted on using the Swedish spelling of Bjorken's name. Once he said, jokingly, that Björkén is the only Swede who doesn't know how to spell his own name.

C. Jarlskog (Ed.), *Portrait of Gunnar Källén*, DOI 10.1007/978-3-319-00627-7_56,

restrict myself to just one point with the hope, that I might influence you slightly there. I am referring to the bottom of p. 8 of the manuscript, where you get involved with questions of rigour. Don't you think it is rather unfair to discuss such things only in connection with one of the contributions? Even if I certainly agree with you that the standard of rigour involved here is not comparable to axiomatic field theory, I would still like to insist that there is absolutely no comparison between my argument and the rest of contributions during the conference. I really don't think I am unreasonable if I insist that you ought to modify your comment at this point.

Incidentally, I am not coming to the DESY-meeting in Hamburg.

Sincerely yours

Gunnar Källén"

Bjorken's Recollections

Bjorken has kindly provided [3] the following information about the 1965 meeting:

"I doubt that folks outside Sweden really appreciate the magnitude of the impact that Källén made. Regarding Schladming, that was the first summary talk I ever gave. It was a last-minute request from Urban, who clearly saw my role as arbitrator. The lectures of Källén and Johnson were mostly over my head, and the exchanges between them quite sharp. Although I basically avoided taking sides in my talk (mainly out of technical incompetence), I am proud of it, because I feel that I got closer to the right answer than the protagonists. I argued that their considerations were moot, given the unsolved problem of synthesizing the Fermi theory with QED, and that the asymptotics of QED depended on the nature of the solution to that problem. Regarding what happened after Schladming, there was the program of Johnson, Baker, and Willey. Last fall, I visited Brown Univ. and encountered (retiree) Herb Fried, who put in my hands several of his latest works. He seems to have pursued the subject further and is excited about what he has done[3]. I don't think that Källén's arguments passed the test of time, but I may be wrong there. For me, the fact that Z_1 and Z_2 are gauge dependent makes the issue hinge only on the properties of Z_3. And that pushes things in the direction of the work cited above. …"

[3] Actually I (CJ) had already contacted Herb Fried, but about a different issue [4].

Bjorken also wrote about a visit he had made to Lund:

> "I was invited to Lund to give a talk (late 1960's?) and was hosted most graciously the whole time by Källén, who gave me a personal tour of the Lund facilities, along with the dinner invitation at their home. My talk was on the photon as Goldstone boson, an edgy topic to this day (but one I still entertain. My visit to Brown was motivated by a reminiscence by Guralnik[4] on the origin of his work on the Higgs mechanism. He claims to have been influenced by my Goldstone-photon work. And we are both motivated to Goldstonize the graviton.) Anyway, the Lund talk went rather smoothly, with good critical questions by Gunnar enroute. At the end, he got up and said 'Thank you, Dr. Bjorken, for this very interesting talk – but of course WE do not believe a word of it.'"

In his summary talk at the 1965 School, Bjorken writes [5]

> "Here the Källén point of view is that the theory must at small distances be modified in a profound way, and the present theory bears a relation to the modified theory something like classical to quantum physics."

Källén's Last Words?

In 1968, Källén would argue as follows:

Johnson and his collaborators base their conclusions on an iteration scheme and claim to get a finite result after a finite number of iterations. However, this isn't worth much as it doesn't say anything about the existence of solutions to the basic equations. Before the convergence of the iteration scheme is discussed, one is very far from an existence proof of any kind. After all, ordinary perturbation theory is just an iterative scheme where (after renormalization) each order is finite. This, however, does not mean that this perturbation theory proves the existence of solutions to the basic equations of quantum electrodynamics.

Källén often pointed out that a result obtained in perturbation theory does not necessarily have general validity. Källén had strong suspicion that quantum electrodynamics is not a consistent theory. However, he did not go as far as Landau who claimed that no field theory is consistent!

[4] Here Bjorken is referring to the eminent physicist Gerald S. Guralnik at Brown University, Providence, RI, USA.

References

1. K. Johnson, M. Baker and R. S. Willey, Phys. Rev. Lett. 11 (1963) 518
2. K. Johnson, M. Baker and R. S. Willey, Phys. Rev. 136B (1964) 1111
3. J. D. Bjorken, email communication to CJ, Feb. 2010
4. See Chap. 16
5. J. D. Björken, *in* Proc. 1965 Schladming School, Acta Phys. Austriaca Suppl. II, 239 (note that his name appears with two dots on the letter "o"). This article is reprinted in Bjorken's book "In Conclusion", World Scientific Series in 20th Century Physics, Vol. 32, World Scientific (2003) p. 191