

FOR ROBERTO CASALBUONI, SEPTEMBER 2012

Because of my momentarily health conditions I cannot participate to the conference in honor of Roberto Casalbuoni, but I cannot avoid to write this letter to try to summarize some moments of my long collaboration with him.

In my physicist's life the discussions and collaborations with Roberto have meant very much to me and constituted a substantial portion of my activity. His human qualities, his competence, his intelligence have so made that our work together has lasted for so many years, practically from the time of his thesis in 1969, almost with no interruptions, in spite of geographical difficulties. Other florentine theoreticians have taken part to this long-standing collaboration. I would like to mention in particular Daniele Dominici and Stefania De Curtis, but with Roberto always at the center of the work and ready to make any effort to solve difficulties and introduce ideas.

Roberto asked me for his thesis when I was in Florence in 1969. The first work involved also Longhi and was an application of what were called at the time sidewise dispersion relations. But almost simultaneously our interest was taken by the possibility of realizing infinitely rising trajectories, a field which interested a number of theoreticians at that time, including Gell-Mann. In the following years Roberto developed his interest to more formal issues, using his exceptional mathematical abilities, and following a path leading to supersymmetries and anticommuting variables. It is from this time his collaboration with Gomis and with the Domokos, and also with other young physicists from Florence: Lusanna, Barducci, Buccella, Sorace.

After that, during the last months of 1979, and for the following years it became possible to establish again our collaboration which had been made difficult by all the financial and geographical problems. A subject which had at the time an original interest, and which had excited our scientific curiosity, was an attempt to find out whether it would be possible to formulate models where quarks and leptons appeared as composite of hypothetical subcomponents. 't Hooft anomaly conditions were a stringent bound on such models. We did not find any really viable and convincing model but we hope that the effort we did, which had arisen at that time much interest, may still remain of some utility at least for a much later future. Our collaboration involved also in part Dominici, Bordi, and Giusti.

We then entered a new field of investigation which would have taken many more years of our research, including Stefania De Curtis in the group, and later Barducci and Pettini, and centered on the study of the phases of QCD and on the use of the composite operator formalism. Our contribution to the establishment of the critical point has been historically recognized and these developments have recently been summarized by Roberto during a conference on "Critical Point and Onset of Deconfinement" in July 2006. These developments lead us formally to the study of a possible strong electroweak sector, with a subsequent vast collaboration which included also Marseille, with Chiappetta, Fiandrino, Cousinou, and also Feruglio, Deandrea, Di Bartolomeo, Grazzini, Mele, Taxil, and Terron, and for some items Gunion.

During that period occasional additional work was done particularly on the Gross-Neveu model including the collaboration of Modugno, and also some work on parity violation in cesium with additional collaboration of Riemann. The group (Roberto, Stefania, Di Bartolomeo, Ferruccio, Mangano) also worked at that time on precision electroweak data in collaboration with Altarelli.

The last important part of our activity has been centered on the

collaboration with the late Beppe Nardulli, our best friend and irreplaceable collaborator, on the general subjects of color superconductivity and of heavy mesons. In particular on heavy mesons our work was summarized in a long complete review article, with Deandrea, Di Bartolomeo, and Feruglio, which is still used in this field. Our interest started from the color-flavor-locked phase and moved to the study of a crystalline phase with participation of Mannarelli, De Fazio, Fabiano, Ruggieri, Stramaglia, Ciminale, and Ippolito. At the beginning of this period Roberto and I wrote a paper on the effective superconducting theory which is now reported on most of the books on the subject.

The love of Roberto for group theoretical problems and formal questions in field theory has never ceased after all these collaborations. He did work on noncommutative theories, on projective groups, on algebraic integration, on strings, particularly with Gomis, and he is still efficiently contributing to such topics.

Roberto has given many important courses on field theory and occasionally on other subjects, such as critical phenomena and historical subjects. Particularly important were the courses he gave in Geneva and in Florence on quantum field theory, which formed the basis of his recent book "Introduction to Quantum field Theory" published last year by World Scientific. The book is very interesting for its accessibility and for the details of the developments. It is clearly and simply written and testifies of the pedagogical abilities of Roberto.

It would be cumbersome to enumerate the great number of advanced seminars, conferences, workshops of Roberto. They cover phenomenology, mathematical physics, and occasionally subjects of scientific policy. His review papers are well known and currently quoted by theoreticians. Roberto has made research besides Florence and Geneva also at the Johns Hopkins University, at Cern, at Desy and last SLAC.

Roberto became full professor in 1987 at University of Lecce, where he remained for almost three years. When this happened he said proudly that our collaboration, which constantly involved Florence, Geneva, and some times other universities, had extended to include Lecce. From the point of view of Florence he considered himself as a guest at that time. A guest who had directed during six long years the local section of INFN. He came back in Florence to later become Faculty Dean, and still later a member of the Administrative Council of the University. But what deserves perhaps a special mention is his enthusiastic activity to establish in Florence the Galileo Galilei Institute and the Open Lab.

It does not belong to me to describe the purpose, utilities, and realizations of the Galilei Institute. But Florence, because of its vast contribution to theory, in great part due to Roberto's work, and because of the presence of the Galilei Institute, is now considered everywhere in the world as one of the most important centers in Italy for theory. To me, who arrived in Florence at a time when very little existed and when any development took much work and unbelievably strong efforts, this comes as a point of satisfaction and of gratitude to all the younger people who have contributed to the success. Ademollo and Veneziano should be also mentioned here. But historically Roberto had a prominent role.