

RECENSIONI



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PREPARATA'S PATHWAY
HOW QUANTUM FIELDS KEEP ALL MATTER TOGETHER

Associazione per la Fondazione Giuliano Preparata.
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Giuliano Preparata passed away the day after Easter of the year 2000, at the age of 58. In the same year, his beloved wife Emilia Campochiaro established the "Associazione Giuliano Preparata". This book is part of the cultural activity of the Associazione.

Giuliano left us a vast, multifaceted, polychrome I would say, scientific production, rich of its lights and of its shadows. He published about 400 theoretical articles on specialised journals and a book. The topics range from subnuclear and nuclear physics, to superconductivity and superfluidity, to condensed matter physics, water in particular, but also glasses and colloids, to astrophysics and to the so-called "cold fusion".

His warm and frank character, his open and loud words, made him fond friends, and bitter enemies. Having been amongst the former, both of us loving physics but usually quarreling on it, I feel free to state that the worst enemy of Giuliano was Giuliano himself. He was a controversial fellow, but no controversy exists on him having been a very noticeable scientist. He had a vast culture and used it for the most different scopes; for example, when criticizing the development of quantum chromodynamics that he was fighting, once he told me that it was wrong even in the name; being it the dynamics OF the colour, one should use the genitive and call it chromatodynamics.

This book presents a collection of reprints of articles that Giuliano published in thirty years from 1964, giving the reader an easy access to some of his main papers.

The material is divided into four chapters, corresponding to a schematic definition of the

main scientific fields explored by Giuliano, as proposed by the editors. Introductory notes by the editors lead the reader to the relevant physics and recall, from their point of view, the historical context in which the papers were developed.

The articles in the first chapter date from 1964 to 1972, namely the period in which what we know as the Standard Model was developed. Starting from darkness, theorists had to try different ideas, chose different paths, many unsuccessful, and learn from the errors. Giuliano contributed initially in the school of R. Gatto, his master, in Florence with other "gattini" (gatto means cat, gattini means kittens) in a symmetry guided approach to particle physics. While four representative articles of this period are included, unfortunately one does not find the very important paper written, when he was at Princeton in 1968, with V. I. Weissberger on the renormalization of the axial vector vertex. Well documented is instead the following effort, together with R. Brandt, when Giuliano, then at New York, moved into quantum field theory (QFT), mastering its physical and mathematical aspects in the study of the light-cone singularities. Notice that in those years it was not at all clear whether the QFT or the Scattering Matrix approach was the right route to the theory to be developed.

I really enjoyed reading again the beautiful article that opens the second chapter. It is written with R. Bonifacio at Harvard in 1969 on a coherent spontaneous emission electromagnetic phenomenon, namely the Dicke super-radiance. I had studied that paper almost half a century ago when designing an

experiment on super-radiance with N_2 for my students laboratory.

The second part of the book jumps to the late 1980s, when Giuliano proposed and developed a novel approach to quantum electrodynamics in non-relativistic conditions and its application to a number of problems in condensed matter physics. These included controversial claimed discoveries as water memory and cold fusion. His theoretical results have been criticized by many, an issue in which, not being a theorist, I cannot enter. As a physicist, however, I recall that even the most beautiful theory must resist to the verification of correctly performed experiments. This was not the case of the "discovery" of the water memory, as the result of a non-blind procedure. When the correct double blinding was employed the effect disappeared. Similarly, cold fusion, whose evidence was contradictory since the very start, was definitively proven not to exist by properly controlled and reproducible experiments. Surprisingly enough, the editors do not discuss, and do not even mention this experimental evidence.

The daring ideas of Giuliano Preparata were never conventional, sometimes wrong, but always motivated by his love for physics and aimed at pushing forward the frontier in an incredible range of physics topics. It would have been nice for the reader to find in this book a more critical and unbiased discussion of the deepest roots of his unique way of thinking and of those brilliant insights that will remain with us.

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