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FOREWORD

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This special issue of Few-Body Systems collects original efforts of the community in the field of "Relativistic Description of Two- and Three-body Systems in Nuclear Physics" (October 19–23, 2009, ECT*). While we were completing the editorial and reviewing processes, we were shocked by the sad news that our outstanding colleague Prof. John Alexander Tjon, suddenly passed away on 20 September 2010 in Bilthoven, The Netherlands.

For his great achievements and leading role, Tjon has to be considered one of the "fathers" of modern Few-Body Physics. He was a skilled and innovative scientist, with an outgoing and cheerful personality. He was extremely interested not only in various physics matters, but also in the lives, expectations, and fortunes of his colleagues and collaborators working in the same field. We have met him several times, especially at the conferences on few-body physics. Just spending a few minutes with John was sufficient to appreciate his acuteness and sensitiveness.

The research activity for extending the realm of investigation of the accurate non relativistic approaches, by including, possibly in a non perturbative way, the fulfillment of general properties, as the Poincaré invariance, or even full covariance by dealing with antiparticle degrees of freedom, has been greatly influenced by his creative ideas. His interests covered a wide range of topics, from the calculations of the three-body Faddeev equations, to the Bethe–Salpeter equation investigated both through three-dimensional reductions and the advanced and original application of the Feynman–Schwinger approach, always taking into great account the phenomenology. His scientific journey could be ideally started from the solution of the Faddeev equations for the three-nucleon bound state, by using local two-body interactions (different from the standard and simplified choice of separable interactions, mainly used at that time). This work quickly became a benchmark in the few-body community. The next steps, driven by the advent of accurate experiments on the electromagnetic interactions of very light nuclei at high momentum transfers, were the investigation of possible relativistic generalizations of the Faddeev equations and the quasi-potential equations for generating solutions of the Bethe–Salpeter equation for the two-nucleon system. Noticeably, he was the first to apply the Feynman–Schwinger representation for comparing ladder and generalized ladder sums in scalar field theories, providing a numerical demonstration of the relevance of crossed ladder diagrams in nonperturbative calculations. In the 80s and 90s, he investigated the relativistic treatment of the proton scattering by nuclei, and by exploiting his previous researches on the nucleon–nucleon interaction, he was able to shed light on

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the theoretical basis of the potential adopted in the relativistic calculations of that process. Among his latest interests, of particular relevance was the very intriguing experimental result obtained at the Thomas Jefferson National Accelerator Facility, on the ratio between the electric and magnetic form factors of the proton, in sharp contrast with the values extracted from the SLAC data. He brightly noticed that the standard description in terms of one-photon exchange could be inadequate, and moving beyond the Born approximation, he performed, with several co-workers, calculations of the two-photon exchange amplitude, obtaining a remarkable reduction of the discrepancy between new and old data. In his latest paper, he dealt with the same issue, but for the electric form factor of the pion.

From this short description of the scientific life of Tjon, one can immediately realize that the few-body community has been strongly influenced by his activity, and many of the topics discussed in the present ECT* Conference are just the continuation of the original ideas laid out by John in his seminal works. As a matter of fact, on the one hand, there already exists a number of challenging experimental puzzles (e.g., the neutron-deuteron analyzing power at low-energy or the detailed behavior at high momentum transfer of the electromagnetic deuteron form factors); on the other hand, new experimental facilities are forthcoming (as the approved 12 GeV upgrade of the electron accelerator at the Thomas Jefferson National Accelerator Facility) and this makes desirable the relativistic treatment of the nuclear systems involved in the proposed experiments. In view of this, the compelling motivation for organizing the ECT* Conference has been to set up an appropriate place for both discussions and cross-fertilizations between the non relativistic Few-Body community and the relativistic one. Indeed, this motivation, fully in line with the John's scientific legacy, is reflected in the Editorial choice of putting mini reviews close to research papers, pointing to the fruitful interaction between experts in the different topics and younger colleagues, in order to widen their expertise, and to acquaint them with the most accurate and/or recent approaches.

Finally we would thank the people, who made it possible to organize the Conference and to disseminate what has been achieved. First of all, we are pleased to express our gratitude, for both the financial support and the warm and generous hospitality, to the "European Centre of Theoretical Studies in Nuclear Physics and Related Areas", in Trento. In particular, we acknowledge Prof. Achim Richter, Director of ECT*, the Scientific Board, and the Staff. Secondly we are very indebted to *Few-Body Systems*, that offered the possibility of publishing this special issue, with a particular mention of the passion, the continuous help and advice of Dr. Bernard Bakker, Editor in Chief. Last but not least, we would like to warmly acknowledge all the participants, since, thanks to them, the discussions and the presentations were alive and fruitful, and this issue has come into the world.