Few-Body Syst (2021) 62:30
https://doi.org/10.1007/s00601-021-01616-1

Craig D. Roberts

New Trends in Hadron Physics: A Few-Body Perspective

Received: 25 May 2021 / Accepted: 27 May 2021 / Published online: 4 June 2021

The idea for this topical issue surfaced during discussions at the 2019 European Conference on Few-Body Problems in Physics (EFB24), which took place over six days (1–6 September 2019) at the University of Surrey, UK. No one knew then that EFB24 was to be one of the last face-to-face meetings before the appearance of COVID-19, which still plagues us today.

The motivations for this issue are found in the intense experimental and theoretical efforts being pursued worldwide in hadron physics, which straddles the border between nuclear and particle physics. Experiment sees the operation, construction and planning of many facilities, *e.g*. BESIII at the Beijing electron positron collider; COMPASS and (approved) COMPASS++/AMBER at CERN; Jefferson Lab running at 12 GeV; KLOE at DAΦNE; the relativistic heavy ion collider at Brookhaven National Laboratory; the large hadron collider beauty experiment; the Facility for Antiproton and Ion Research (FAIR); the Nuclotron-based Ion Collider fAcility (NICA); and electron ion colliders in the USA (EIC) and China (EicC). On the phenomenology and theory sides, with the work of bridging themes in nuclear and particle physics, there is ample room for exploitation of methods introduced and tested in the study of few body systems. These are most straightforwardly employed in connection with few-nucleon systems, light hypernuclei and constituent-quark dynamics for baryons and multiquark systems. On the other side of this coin are attempts at *ab initio* analyses of mesons, baryons, and hybrid bound-states using quantum field theory equations of motions, which include such few-body physics staples as the Bethe–Salpeter, Faddeev and Faddeev–Yakubowski equations, *etc*. In the quantum field theory context, although the equation names are familiar, new challenges are encountered in formulating and solving these equations; notably, the demands of Poincaré-covariance and the veracious treatment of symmetries and the patterns by which they are broken.

In all these areas, great strides forward have been made during the opening vicennium of our new millennium, an array of which are highlighted in this collection. Some of the contributions are reviews, canvassing topical issues; but most are better described as feature articles, which include original material and highlight new and promising directions in hadron physics. All contributions recognise and emphasise the vitality of the collaborative international endeavour, across experiment, phenomenology, and theory, which seeks ultimately to explain the emergence of nuclei from the wonderfully simple Lagrangian of quantum chromodynamics. This, indeed, is one of the greatest challenges facing science today.

C. D. Roberts (✉)
School of Physics, Nanjing University, Nanjing 210093, Jiangsu, China
E-mail: cdroberts@nju.edu.cn

C. D. Roberts
Institute for Nonperturbative Physics, Nanjing University, Nanjing 210093, Jiangsu, China

The Members of the Editorial Board of Few Body Systems would like to thank all who accepted our invitation to contribute an article to this topical issue and also the referees who donated their time in order to ensure that the project was a success.