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Symmetry/Asymmetry: Quantum Physics and Quantum Electrodynamics

Guest Editor:

Prof. Dr. Dmitry Gitman
1. I.E. Tamm Theory Division, The P.N. Lebedev Physical Institute, 53 Leninsky Pr., 119991 Moscow, Russia
2. Institute of Physics, The University of Sao Paulo, São Paulo 05508-070, Brazil

Deadline for manuscript submissions:
closed (31 March 2024)

Message from the Guest Editor

Dear Colleague,

Quantum electrodynamics is the longest and most mature branch in the development of quantum field theory, abbreviated as QED. It mainly describes the fundamental process of photons interacting with charged particles. It studies the quantum nature of electromagnetic interactions , the generation and annihilation of charged particles, the scattering between charged particles, and the scattering between charged particles and photons. It is very prominent in modern physics in terms of its wide application range, simple and clear basic assumptions, and high precision in the degree of agreement with experiments. QED is the first successful quantum field theory and is an important part of the standard model theory.

The extension of the symmetry of the standard model of elementary particles involves abelian and non-abelian groups of symmetry that lead to various physical and cosmological effects of QCD-like and QED-like new physics. Cutting-edge applications of QED often utilise the spatial and temporal symmetries of the light and the material under investigation—for example, in studies related to chiroptical phenomena and chirality.

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Editor-in-Chief

Prof. Dr. Sergei D. Odintsov
1. Institució Catalana de Recerca i Estudis Avançats (ICREA), Passeig Luis Companys, 23, 08010 Barcelona, Spain
2. Institute of Space Sciences (ICE-CSIC), C. Can Magrans s/n, 08193 Barcelona, Spain

Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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Symmetry Editorial Office
MDPI, St. Alban-Anlage 66
4052 Basel, Switzerland

Tel: +41 61 683 77 34
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mdpi.com/journal/symmetry
symmetry@mdpi.com
𝕏@Symmetry_MDPI