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Symmetry in Atomic, Nuclear and Particle Physics

Guest Editors:

Dr. Johann Marton
Stefan Meyer Institute for Subatomic Physics, Austrian Academy of Science, 1090 Vienna, Austria

Prof. Dr. Klaus Jungmann
Faculty of Science and Engineering, University of Groningen, Zernikelaan 25, 9747 AA Groningen, The Netherlands

Prof. Dr. Eberhard Widmann
Stefan Meyer Institute for Subatomic Physics, Austrian Academy of Science, 1090 Vienna, Austria

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Message from the Guest Editors

Discrete symmetries (charge conjugation C, parity P, time reversal T) and combined symmetries like CP and CPT play a fundamental role in our understanding of physics. High precision studies are indispensable because of obviously tiny violations in symmetries in atomic, nuclear and particle physics. The violation of symmetries can open our view of fundamental basis of modern physics and can provide input for extensions or even new approaches toward the understanding of open questions. As an example the experimental finding of CP violation in the kaon and B-meson sector is discussed as symmetry breaking leading to the evident matter-antimatter asymmetry (i.e. missing primordial antimatter in the universe), which is one of the most important questions nowadays. Other symmetry breaking tests concern the T-symmetry, which can be investigated by searching for static electric dipole moments (edm) like the edm of the neutron, which is one of the hot and challenging topics in experimental research now. This special issue will give an overlook of theoretical and experimental research and results on symmetry studies in atomic, nuclear and particle physics.

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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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Contact Us

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

Tel: +41 61 683 77 34
www.mdpi.com

mdpi.com/journal/symmetry
symmetry@mdpi.com
𝕏@Symmetry_MDPI