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Symmetry Breaking in Quantum Phenomena

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Message from the Guest Editors

The break of symmetries in physical systems, either in or out of equilibrium, gives rise to a number of phenomena, which allow to probe topological and symmetric properties of the states of the systems, as well as of their underlying field theory. In the case of discrete symmetries, for instance, the presence of a magnetic field breaks the time-reversal symmetry in free space, and the electromagnetic vacuum is said to present magnetic birefringence; likewise, time-reversal violation modifies the Casimir interaction between non-reciprocal media; in magneto-chiral media, it is the simultaneous violation of parity and time reversal that gives rise to a vacuum momentum; and the break of parity in an asymmetrically excited system is at the origin of the apparent violation of the action-reaction principle. In addition, spontaneous symmetry breaking [....]

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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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