Special Issue

New Challenges in Cavity Magnonics and Symmetry

Message from the Guest Editors

Cavity magnonics—the emerging interdiscipline of cavity quantum electrodynamics and magnonics—has been rapidly developing in recent years. Cavity magnon-polaritons (CMPs) are a new type of bosonic quasiparticles caused by the hybridization of magnons and cavity photons, which has been detected and characterized via the anti-crossing transmission spectrum. The entangled spin orientation and photon number state in CMPs enables an efficient quantum information transfer between photon and magnon via Rabi oscillation, which is promising for quantum computing.

Recently, non-Hermitian physics and parity-time symmetry have attracted considerable attention. The non-Hermitian Hamiltonians allow the entirely real spectrum as long as the combined parity (P) and time (T)-reversal symmetries are respected. The non-Hermitian singularities, called exceptional points, have been experimentally observed in the cavity magnonic system. Conventional CMPs have a finite lifetime due to the intrinsic losses of photons and magnons. Pumping the cavity to compensate the dissipation may extend the coherent time of a CMP and lead to a dynamical equilibrium.....

Guest Editors

Dr. Yunshan Cao

School of Electronic Science and Engineering and State Key Laboratory of Electronic Thin Films and Integrated Devices, University of Electronic Science and Technology of China, Chengdu 610054, China

Prof. Dr. Xiansi Wang

School of Physics and Electronics, Hunan University, Changsha 410082, China

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Symmetry
Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
symmetry@mdpi.com

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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.

Editor-in-Chief

Prof. Dr. Sergei Odintsov
1. ICREA, 08010 Barcelona, Spain
2. Institute of Space Sciences (IEEC-CSIC), C. Can Magrans s/n, 08193 Barcelona, Spain

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