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Quantum Mechanics and Symmetry/Asymmetry: Review Paper on Quantum Nonlinear Interferometers

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Message from the Guest Editor

In metrology, nonlinear interferometers present a versatile technique for sensitive phase measurements and form the basis for detecting gravitational waves. Such interferometers contain nonlinear elements (parametric down-conversion, four-wave mixing) instead of conventional beam splitters, and have many advantages over their linear counterparts in terms of measurement accuracy, state engineering and loss resistance. Nonlinear interferometers can be realized in different geometries and produce quantum light with various spectral and spatial profiles, mode structure and orbital angular momenta. At the same time, due to strong correlations between signal and idler photons generated within such interferometers, they are promissing tools for testing the symmetry of objects, their chirality, and can be used in many quantum applications, from quantum imaging to quantum communication and quantum cryptography.

This Special Issue, “Quantum nonlinear interferometers”, will feature articles with a broad scope of research on the properties of nonlinear interferometers and their applications in metrology and other branches of science.

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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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