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Symmetry in Quantum Optics Models

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Message from the Guest Editor

Prototypical quantum optics models, such as the Jaynes–Cummings, Rabi, Tavis–Cummings, and Dicke models, are commonly analyzed with diverse techniques, including analytical exact solutions, mean-field theory, exact diagonalization, and the like. The analysis of these systems strongly depends on their symmetries, ranging, e.g., from a $U(1)$ group in the Jaynes–Cummings model to a Z_2 symmetry in the full-fledged quantum Rabi model.

In this Special Issue, we intend to gather a series of articles related to symmetry in quantum optics models, possibly including, but not exclusively, the Jaynes–Cummings, Rabi, Tavis–Cummings, and Dicke models. We will also consider their generalizations to, e.g., inhomogeneous light–matter couplings, bias terms, time-dependent couplings, as well as all possible regimes of the light–matter interaction. We welcome papers on mathematical physics, related either to spectral analysis or time dynamics, as well as more applied articles with proposals for implementations of and/or experiments with these or related models in quantum platforms.

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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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