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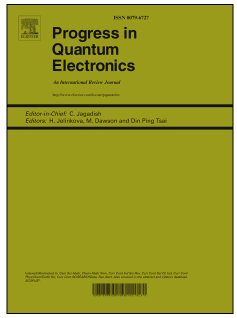

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Two-dimensional topological photonic systems

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Abstract

The topological phase of matter, originally proposed and first demonstrated in fermionic electronic systems, has drawn considerable research attention in the past decades due to its robust transport of edge states and its potential with respect to future quantum information, communication, and computation. Recently, searching for such a unique material phase in bosonic systems has become a hot research topic worldwide. So far, many bosonic topological models and methods for realizing them have been discovered in photonic systems, acoustic systems, mechanical systems, etc. These discoveries have certainly yielded vast opportunities in designing material phases and related properties in the topological domain. In this review, we first focus on some of the representative photonic topological models and employ the underlying Dirac model to analyze the edge states and geometric phase. On the basis of these models, three common types of two-dimensional topological photonic systems are discussed: 1) photonic quantum Hall effect with broken time-reversal symmetry; 2) photonic topological insulator and the associated pseudo-time-reversal symmetry-protected mechanism; 3) time/space periodically modulated photonic Floquet topological insulator. Finally, we provide a summary and extension of this emerging field, including a brief introduction to the Weyl point in