Invited talks

Topological Photonics

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Topology describes the properties of a physical system that remain unaffected under smooth distortions. When considering the electronic transport in solids, these properties are related to a topological invariant: a magnitude characterising the electronic bands and that can only take integer values. The value of the integer directly indicates the number of conducting channels at the edges of the solid, with transport properties robust to disorder and deformations. This paradigm has been able to successfully explain the universal transport of the quantum Hall effect and to predict the existence of topological insulators and Weyl semimetals.

When these concepts are brought to photonic lattices, a whole new playground appears for the design of photonic systems with robust channels for the transport of light in a chip. Moreover, the engineering of the hoppings between photonic resonators makes photonic lattices an excellent system to study fundamental topological properties inaccessible in electronic systems, and to develop new concepts such as non-Hermitian topology and topological lasers. In the context of Quantum Technologies and Quantum Computing, topological photonics provides new strategies to design quantum interconnects with very high fidelity.