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【535】Quantum interference of topological states of light

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Topological insulators are materials that have a gapped bulk energy spectrum but contain protected in-gap states appearing at their surface. These states exhibit remarkable properties such as unidirectional propagation and robustness to noise that offer an opportunity to improve the performance and scalability of quantum technologies. For quantum applications, it is essential that the topological states are indistinguishable. We report high-visibility quantum interference of single-photon topological states in an integrated photonic circuit. Two topological boundary states, initially at opposite edges of a coupled waveguide array, are brought into proximity, where they interfere and undergo a beamsplitter operation. We observe Hong-Ou-Mandel interference with 93.1 ± 2.8% visibility, a hallmark nonclassical effect that is at the heart of linear optics–based quantum computation.

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