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Experimental realization of microwave photonic topological insulators JIANWEN DONG, Sun Yat-sen University — Topological properties play a fundamental role in many physical phenomena. While topology focus on electronic systems, there has been a recent emergence of interest in exploring topological orders with photons. Recent experiments have demonstrated substantial progress towards the implementation of Hamiltonians with topological robustness, from microwave to visible frequency domains. Here, we will show the demonstration on nontrivial photonic bandgaps, as well as the topologically protected edge states. We designed and fabricated a metacrystal comprising non-resonant meta-atoms sandwiched between two metallic plates. Spin Chern number of photonic crystals is calculated based on group theory and accurately predicts topological characters of edge states in different gaps. Topologically nontrivial gaps are achieved by mode exchange at high symmetric k-points. Nontrivial bandgap was confirmed by experimentally measured transmission spectra and calculated nonzero spin Chern number. Gapless spin-filtered edge states were demonstrated experimentally by measuring Ez fields and Hz fields, as well as their phase differences. Robustness of the edge states were also observed when an obstacle is introduced near the edge.

Jianwen Dong
Sun Yat-sen University

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