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Observation of photonic edge states in Silicon MOHAMMAD HAFEZI, JINGYUN FAN, SUNIL MITTAL, ALAN MIGDALL, JACOB TAYLOR, Joint Quantum Institute — Systems with topological order exhibit exotic phenomena including fractional statistics. While most systems with topological order have been electronic, advances in our understanding of synthetic gauge fields have enabled realization of topological order in cold atoms or even with photons. We demonstrate the experimental realization of synthetic magnetic fields for infrared photons at room temperature. Our implementation corresponds to a synthetic spin-orbit Hamiltonian, which requires linear optics and does not break time reversal symmetry. As a direct proof of topological order, we observe for the first time, edge states for light in a two-dimensional system. This realization in principle allows investigation of wider range of topological order in photonics system by entering the non-interacting and many-body regimes.

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