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Chern number measurement in photonic Landau levels NATHAN SCHINE, MICHELLE CHALUPNIK, JONATHAN SIMON, Univ of Chicago — Nontrivial topology is at the heart of a host of intriguing phenomena in condensed matter physics. Synthetic materials consisting of a quantum gas of photons or ultracold atoms have established themselves as ideal systems to explore these phenomena. As experiments push into the strongly-interacting, strongly-correlated regime, characterizing topological many-body states through measurements of topological quantum numbers becomes critical. We present a real-space Chern number measurement in a photonic integer quantum Hall system, produced in a degenerate manifold of a multimode non-planar ring resonator. Through controlled spatial excitation of the resonator and holographic reconstruction of the resulting modes, we measure arbitrary 'band projectors' from which the Chern number is calculated. This system and measurement technique is compatible with strong interactions via cavity Rydberg electromagnetically induced transparency. We will further discuss how spatial curvature in our system allows measurement of two additional topological quantum numbers, enabling detailed characterization of novel manybody quantum states.

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