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Fractional Quantum Hall Physics with Interacting Floquet Polaritons LOGAN W. CLARK, NATHAN SCHINE, CLAIRE BAUM, TIAN-XING ZHENG, NINGYUAN JIA, JONATHAN SIMON, University of Chicago — Photonic systems offer a promising new platform for exploring the exotic features of topological quantum materials on a particle-by-particle basis. We describe our efforts to explore this physics using cavity Rydberg polaritons - hybrids of an optical cavity photon and an atomic Rydberg excitation - which can interact with each other while moving in a synthetic magnetic field. Using Floquet engineering, we isolate a small, degenerate puddle of states, in which interacting photons can self-organize with topological order. This platform has enabled our initial experiments on creating and detecting photonic Laughlin states, the ground states of a fractional quantum Hall system.

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