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Single photon Chern insulator with superconducting microwave lattices[1] CLAI OWENS, BRENDAN SAXBERG, RUICHAO MA, JONATHAN SIMON, DAVID SCHUSTER, University of Chicago — We present the latest progress in developing a new architecture for exploration of topological quantum matter. We construct microwave photonic lattices from tunnel-coupled, time-reversal-broken microwave cavities that are both low loss and compatible with Josephson junction-mediated photon-photon interactions, allowing us access to topological phenomena such as the fractional quantum Hall effect. We employ seamless 3D microwave cavities all machined from a single block of niobium, so our meta-material is scalable and directly compatible with the cQED toolbox, as it is composed only of niobium for the cavities, plus Yttrium-Iron-Garnet (YIG) spheres and Neodymium magnets to produce the synthetic magnetic field. After observing topologically protected chiral edge states with microsecond lifetimes circling the superconducting lattice, we are now coupling the Josephson junction qubits to lattice sites in order to add nonlinearity and particle interactions.

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