A Superconducting Harper-Hofstadter Lattice for Microwave Photons\textsuperscript{1} CLAI OWENS, AMAN LACHAPELLE, BRENDAN SAXBERG, RUICHAO MA, DAVID SCHUSTER, JONATHAN SIMON, University of Chicago — We present the latest progress in developing a novel architecture for exploration of topological matter. We construct photonic lattices from tunnel-coupled, time-reversal-broken microwave cavities that are both low loss and compatible with Josephson junction-mediated particle-particle 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 high purity superconductor, along with Yttrium-Iron-Garnet (YIG) spheres magnetically biased below the critical field so our meta-material is scalable and directly compatible with the circuit QED toolbox. After demonstrating the essential properties of a time-reversal broken topological insulator at room temperature without interactions, we now push towards coupling Josephson junction qubits to a cryo-compatible superconducting lattice.

\textsuperscript{1}This work was primarily supported by the University of Chicago Materials Research Science and Engineering Center, which is funded by the National Science Foundation under Award No. DMR-1420709. This work was supported by ARO Grant No. W911NF-15-1-0397. D.

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Date submitted: 26 Jan 2018

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