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Engineering Topology and Interactions in Superconducting Microwave Cavity Lattices[1] CLAI OWENS, AMAN LACHAPELLE, BRENDAN SAXBERG, RUICHAO MA, DAVID SCHUSTER, JONATHAN SIMON, University of Chicago — We present our latest progress in developing a novel architecture for exploration of topological matter using lattices of superconducting microwave cavities coupled to Josephson junction qubits. We show how microwave photons can be engineered to experience magnetic fields and 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 to break time reversal symmetry while still maintaining scalability and compatibility with the circuit QED toolbox. We then present our latest push towards coupling Josephson junction qubits to a cryo-compatible superconducting lattice.

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Clai Owens
University of Chicago

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