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A cold atom-nanophotonic apparatus for exploring photon-mediated long-range atom-atom interaction TZU-HAN CHANG, BRIAN FIELDS, MAY KIM, CHENG-AN CHEN, CHEN-LUNG HUNG, Purdue University — Studying many-body systems subject to long-range interactions experimentally has remained a difficult problem. Experiments with trapped atoms near nanoscale photonic waveguides and cavities have demonstrated the possibility in using strong coupling between single atoms and single photons to mediate long-range interactions between atomic pseudo spins. It would also be possible to engineer various long-range quantum spin models that are otherwise difficult to achieve in other systems. We expect to observe rich physics arising from these new hybrid platforms. In this poster, we report on our progress towards building an apparatus for the exploration of photon-mediated long-range atom-atom interaction. Specifically, we describe the synthesis of an optical chip with microring resonators, and the localization of an array of atoms loaded in optical tweezer traps to induce strong atom-light coupling in the resonator.

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