

Abstract Submitted  
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**Trapped atom array along a microring resonator** MAY KIM, TZU-HAN CHANG, BRIAN FIELDS, CHEN-LUNG HUNG, Purdue University — We report on the design and experimental progress toward realizing a novel hybrid system, in which ultracold atoms are trapped in extremely close proximity to the surface of a microring resonator, allowing the guided mode photons to mediate strong and long-range atom-atom interactions. The development of high quality factor microring resonators on an optical chip capable of trapping atoms 100 nm above the surface will be discussed. Our current design allows us to achieve high cooperativity, or strong atom-light interaction. We will also present our schemes to control the position and the movement of the atoms using optical tweezer traps and probe the resulting quantum states through fluorescence imaging and single photon counting. Finally, we discuss possible long-range spin models that can be engineered using our platform, including quantum magnetism extending far beyond nearest neighbor interactions.

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