Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Strong coupling of two individually controlled atoms via a nanophotonic cavity[1] POLNOP SAMUTPRAPHOOT, TAMARA DORDEVIC, PALOMA OCOLA, BRANDON GRINKEMEYER, Harvard University, HANNES BERNIEN, University of Chicago, CRYSTAL SENKO, University of Waterloo, VLADAN VULETIC, Massachusetts Institute of Technology, MIKHAIL LUKIN, Harvard University — We demonstrate photon-mediated interactions between two individually trapped atoms coupled to a nanophotonic cavity. Specifically, we observe collective enhancement when the atoms are resonant with the cavity, and level repulsion when the cavity is coupled to the atoms in the dispersive regime. Our approach makes use of individual control over the internal states of the atoms, their position with respect to the cavity mode, as well as the light shifts to tune atomic transitions individually, allowing us to directly observe the anti-crossing of the bright and dark two-atom states. These observations open the door for realizing quantum networks and studying quantum many-body physics based onatom arrays coupled to nanophotonic devices.

[1]This work was supported by the Center for Ultracold Atoms, the National Science Foundation, AFOSR MURI, Vannevar Bush Faculty Fellowship, and ARL CDQI.

Polnop Samutpraphoot
Harvard University

Date submitted: 29 Jan 2020 Electronic form version 1.4