Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Rydberg Interactions in a High Finesse Optical Cavity YUANXI CHAO, AKBAR JAHANGIRI, JAMES SHAFFER, University of Oklahoma — We present progress on our light-Rydberg atom interaction experiment in a high finesse optical cavity, ∼28000. We studied cavity assisted Rydberg electromagnetically induced transparency (EIT) in the presence of an interactivity electric field of ∼2V/cm and a magnetic field of ∼1G[1]. We access Rydberg states with principle quantum numbers n > 50 to study dipole blockade. We show the theoretical and experimental results for our system under such intracavity fields, where the Rydberg blockade excitations can strongly couple to the cavity modes. n > 50 is suggested by our pair interaction calculations so that we can observe Rydberg-Rydberg interactions and form superatoms inside our cavity. The Rydberg atom-cavity system can be useful in controlled photon generation for quantum information processing[2].

[1] Jiteng Sheng et al., Phys. Rev. A **96**, 033813 (2017)
[2] Santosh Kumar et al., J. Phys. B **49**, 064014 (2016)

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Date submitted: 01 Feb 2019 Electronic form version 1.4