Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

**The role of thermal motion in free-space light-atom interaction**[1]

YUE SUM CHIN, Centre for Quantum Technologies, National University of Singapore, MATTHIAS STEINER, CHRISTIAN KURTSIEFER, Centre for Quantum Technologies, National University of Singapore; Department of Physics, National University of Singapore — The prospects of distributed quantum networks have triggered much interest in developing light-matter interfaces. While this is usually realized by optical resonators, tightly focused free-space interfaces offer a complementary alternative. Our version of free-space light-matter interface is formed by a pair of high numerical aperture (NA=0.75) lenses and a single atom held in an optical tweezer. Operating near the diffraction limit, we demonstrate 17.7% extinction of a weak coherent field by a single atom. The thermal motion of the atom is commonly suspected to be one of the limiting factors of the interaction. Here we verify quantitatively this effect by measuring in-situ the interaction strength as the atom heats up.

[1] Y.S. Chin, M. Steiner, C. Kurtsiefer, arxiv.org, arXiv:1611.08048 (2016).

[1]Ministry of Education in Singapore; National Research Foundation

Yue Sum Chin
Centre for Quantum Technologies, National University of Singapore

Date submitted: 17 Jan 2017 Electronic form version 1.4