Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Spinning optically-levitated microspheres by rotating electric fields. NADAV PRIEL, ALEXANDER D. RIDER, CHARLES P. BLAKEMORE, AKIO KAWASAKI, ALEXANDER FEIGUTH, SANDIP ROY, GIORGIO GRATTA, Stanford University — Precise control of the translational and rotational as well as charge degrees of freedom of optically levitated microspheres have seen significant developments in past years. We demonstrate the controlled spinning of neutral, 2.4um radius microspheres using interaction between the residual electric dipole moment and a rotating electric field generated by electrodes surrounding the trap. The microspheres are trapped by a single, upward-propagating laser beam and the angular velocity can be arbitrarily set by the driving electric field. Damping of the rotation and drag due to the residual gas, wobbling of the electric dipole moment along the rotating direction of the electric field and precession induced by changing the direction of the rotating field have all been observed and match the expectations from classical mechanics. The technique extends the set of degrees of freedom that can be controlled in such a system and will be used to measure and suppress background forces of electrostatic nature in short distance gravity measurements.

Nadav Priel
Stanford University

Date submitted: 30 Jan 2019 Electronic form version 1.4