Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Parametric stabilization of levitated graphene microparticles PAVEL NAGORNYKH, BRUCE KANE, University of Maryland, College Park — After graphene was discovered research on it grew rapidly because of a variety of possible applications arising from its unique properties. Since graphene is strongly affected by its environment, it is desirable to decouple graphene from any kind of substrate when studying it. One of the ways to achieve this is to levitate charged graphene microparticles in a quadrupole trap [1]. Though graphene particles can stay in such trap for weeks under low vacuum conditions ($\sim$1 mTorr), their trapping time is significantly reduced down to a few hours when trap chamber is pumped to ultra-high vacuum ($\sim 10^{-8}$ Torr). In this talk we investigate the possibility of increasing trapping time of such particles as well as for their cooling by means of parametric feedback similar to the feedback scheme used for cooling down laser-trapped nanoparticles [2]. In our system, motion of the graphene is used to provide a feedback signal which in turn is used to modulate a trap frequency at twice the frequency of graphene oscillations. Current progress and possible improvements and applications of such feedback scheme are discussed in the talk.
[1] B. Kane, Phys. Rev. B **82**, 115441 (2010)
[2] J. Gieseler et al., Phys. Rev. Lett. **109**, 103603 (2012)

Pavel Nagornykh
University of Maryland, College Park

Date submitted: 15 Nov 2013 Electronic form version 1.4