Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Effect of stray electric fields on cooling of center of mass motion of levitated graphite flakes PAVEL NAGORNYKH, JOYCE COPPOCK, BRUCE KANE, University of Maryland, College Park — Levitation of charged multilayer graphene flakes in a quadrupole ion trap provides a unique way to study graphene in isolated conditions. Cooling of a flake in such a setup is necessary for high vacuum measurements of the flake and is achieved by using a parametric feedback scheme [1]. We present data showing the strong dependence of the cooling of the flake's center of mass motion on the stray electric fields. We achieve this by using auxiliary electrodes to shift the position of the trap center in space. Once the point of minimum interaction between the stray fields and the particle is found (leading to cooling of the flake motion to temperatures below 20K at pressure of 10^{-7} Torr), we can estimate charge and mass of the flake by observing quantized discharge of the particle and measure transient dynamics of the center of mass motion by turning the cooling off and on. As an additional benefit, the behavior of the flake away from the optimum trap position can be used to quantify stray fields' effect on the particle motion by measuring its spinning orientation and frequency dependence on offset from the optimum position.
[1] J. Gieseler et al., Phys. Rev. Lett. **109**, 103603 (2012)

Pavel Nagornykh
University of Maryland, College Park

Date submitted: 14 Nov 2014 Electronic form version 1.4