

Abstract Submitted  
for the DPP05 Meeting of  
The American Physical Society

**Charging of dust in a negative ion plasma**<sup>1</sup> ROBERT MERLINO, ROSS FISHER, SU-HYUN KIM, NATHAN QUARDERER, Department of Physics and Astronomy, University of Iowa — We investigate experimentally the charging of dust particles in a plasma consisting of positive ions, negative ions and electrons. In typical laboratory plasmas containing electrons and positive ions, dust grains acquire a negative charge. In negative ion plasmas, charging due to the negative ions, in addition to positive ions and electrons, must be taken into account. Calculations show that if a significant fraction of the electrons are attached to negative ions, the magnitude of the charge on the dust particles is reduced. If the ratio  $p = n_e/n_+$  of the electron density to positive ion density is sufficiently small and the positive ions are lighter than the negative ions, then the dust charge can be positive. This possibility is investigated in a Q machine potassium ( $K^+$ ) plasma, into which is added the highly electronegative  $SF_6$  gas which attaches low energy electrons to produce  $(SF_6)^-$  negative ions. The relatively cold electrons in the Q machine plasma ( $T_e = 0.2$  eV) enhances the attachment probability allowing values of  $p < 10^{-3}$  to be attained.

<sup>1</sup>Work supported by the U. S. Department of Energy

Robert Merlino  
University of Iowa

Date submitted: 22 Jul 2005

Electronic form version 1.4