

Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

The effect of negative ions on the charging of dust in a plasma¹

ROBERT MERLINO, SU-HYUN KIM, University of Iowa — We have studied the charging of dust particles in a plasma containing positive ions, negative ions and electrons. In electron/positive ion plasmas, dust particles are typically negatively charged due to the preferential collection of electrons since the electron thermal speed is much higher than the ion thermal speed. However, if the electrons are attached to heavy negative ions, the charging conditions for dust particles can be significantly different. If a substantial fraction of the electrons are attached to negative ions, and if the positive ion mass is less than the negative ion mass, calculations show that it is possible to produce positively charged dust. This possibility was investigated in a Q machine plasma with potassium positive ions and with the addition of an electron attaching gas. The low energy (0.2 eV) Q machine electrons readily attach to the molecules, with resulting electron densities less than $1/10,000^{th}$ of the positive ion density. Results will be presented indicating that under these conditions, glass microspheres (d=35 micron) acquire a positive charge.

¹Work Supported by the U. S. Department of Energy.

Robert Merlino
University of Iowa

Date submitted: 21 Jul 2006

Electronic form version 1.4