

Abstract Submitted
for the PSF13 Meeting of
The American Physical Society

Improved laser heating technique for melting dusty plasma crystals¹ ZACH HARALSON, JOHN GOREE, Dept. of Physics & Astronomy, The University of Iowa — A dusty plasma is a mixture of polymer microspheres, electrons, positive ions and neutral gas atoms. The microspheres acquire an electric charge as large as many thousands of elementary charges, so that a single layer of thousands of microspheres can be electrically levitated by a vertical electric field. Due to the mutual repulsion among these microspheres, they develop such a large interparticle electric potential energy that they arrange themselves with a uniform spacing, analogous to atoms in a crystalline lattice. This so called “dust crystal” can then be melted by using laser heating to give the microspheres more kinetic energy. Movies of the particle motion, shown in this talk, are recorded using video microscopy. We describe experiments to optimize the sweeping of the laser beam during this heating. By tracking the random motion of the individual microspheres, we can explore the relationship between microscopic particle motions and macroscopic phenomena and calculate transport coefficients, such as the diffusion constant.

¹Supported by NSF and NASA.

John Goree
The University of Iowa

Date submitted: 10 Oct 2013

Electronic form version 1.4