Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Heat transport in a two-dimensional complex (dusty) plasma at melting conditions[1] V. NOSENKO, A.V. IVLEV, S. ZHDANOV, G. MORFILL, Max-Planck-Institute for Extraterrestrial Physics, J. GOREE, Dept. of Physics & Astronomy, Univ. of Iowa, A. PIEL, Christian-Albrechts University, Kiel, Germany
— The heat transport in a two-dimensional complex (dusty) plasma undergoing a phase transition was studied experimentally. A single layer of highly charged polymer microspheres was suspended in a plasma sheath. In the absence of manipulation, the suspension forms a 2D triangular lattice. To melt this lattice and form a liquid, we used a laser-heating method. Two focused laser beams were moved rapidly around in the monolayer. The kinetic temperature of the particles increased with the laser power applied, and above a threshold a melting transition occurred. We used video microscopy for direct imaging and particle tracking. The spatial profiles of the particle kinetic temperature were calculated. Using the heat transport equation with an additional term to account for the energy dissipation due to the gas drag, we analyzed the temperature profiles to find a thermal conductivity, which did not depend on temperature.

[1]Work in Iowa supported by DOE and NASA.

Volodymyr Nosenko
Max-Planck-Institute for Extraterrestrial Physics

Date submitted: 21 Jul 2007 Electronic form version 1.4