Abstract Submitted
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Thermal conductivity measurements in a 2D Yukawa system[1] V. NOSENKO, A. IVLEV, S. ZHDANOV, G. MORFILL, Max-Planck-Institute for extraterrestrial Physics, J. GOREE, Univ. of Iowa, A. PIEL, Christian-Albrechts University, Kiel, Germany — Thermal conductivity was measured for a 2D Yukawa system. First, we formed a monolayer suspension of microspheres in a plasma, i.e., a dusty plasma, which is like a colloidal suspension, but with an extremely low volume fraction and a partially-ionized rarefied gas instead of solvent. 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 digital 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 distribution to derive the thermal conductivity.

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