

Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Effect of magnetic field on the phase transition in dusty plasma.¹

SURABHI JAISWAL, Deutsches Zentrum für Luft- und Raumfahrt (DLR), EDWARD THOMAS, Auburn University, RUPAK MUKHERJEE, Institute for Plasma Research — The formation of self-consistent crystalline structure is a well-known phenomenon in complex plasmas. In most experiments the pressure and rf power are the main controlling parameter in determining the phase of the system. We have studied the effect of externally applied magnetic field on the configuration of plasma crystals, suspended in the sheath of a radio-frequency discharge using the Magnetized Dusty Plasma Experiment (MDPX) device. Experiments are performed at a fixed pressure and rf power where a crystalline structure formed within the confining ring, but ramping the magnetic field up to 1.28 T. We report on the breakdown of the crystalline structure with increasing magnetic field. The magnetic field affects the dynamics of the plasma particles and first leads to a rotation of the crystal. At higher magnetic field, there is a radial variation (shear) in the angular velocity of the moving particles which we believe leads to the melting of the crystal. This melting is confirmed by evaluating the variation of the pair correlation function as a function of magnetic field. References:

wati Baruah and nilakshi Das, Physics of Plasmas 17, 073702 (2010).

¹This work was supported by the US Dept. of Energy, DE - SC0010485

Surabhi Jaiswal
Deutsches Zentrum für Luft- und Raumfahrt (DLR)

Date submitted: 21 Jul 2017

Electronic form version 1.4