

Abstract Submitted  
for the DPP06 Meeting of  
The American Physical Society

**Beam-Plasma Interaction in a 2D Complex Plasma** STAMATIOS

KYRKOS, Le Moyne College, G.J. KALMAN, Boston College, M. ROSENBERG, University of California, San Diego — In a complex (dusty) plasma, penetrating ion or electron beams may lead to beam-plasma instabilities. The instability displays interesting new properties when either the plasma or the beam, or both, are strongly interacting<sup>1</sup>. Foremost amongst them is the possible generation of *transverse* instabilities. We consider the case when a 2D plasma is in the crystalline phase, forming a lattice, and the beam is moving in the lattice plane. Both the grains and the beam particles interact through a realistic Yukawa potential. The beam particles are assumed to be weakly coupled to each other and to the lattice<sup>2</sup>. Using the full phonon spectrum for a 2D hexagonal Yukawa lattice<sup>3</sup>, we determine and compare the transverse and longitudinal growth rates. The behavior of the growth rates depends on the direction of the beam and on the relationship between the beam speed  $v$  and the longitudinal and transverse sound speeds  $s_L, s_T$ . For beam speeds between the longitudinal and transverse sound speeds, the transverse instability could be more important, because it appears at lower  $k$  values.

<sup>1</sup> G. J. Kalman and M. Rosenberg, J. Phys. A: Math. Gen. **36** 5963 (2003) <sup>2</sup> M. Rosenberg, G. J. Kalman, S. Kyrkos and Z. Donko, J. Phys. A: Math. Gen. **39** 4613 (2006) <sup>3</sup> T. Sullivan, G. J. Kalman, S. Kyrkos, P. Bakshi, M. Rosenberg and Z. Donko, J. Phys. A: Math. Gen. **39** 4607 (2006)

Stamatios Kyrkos  
Le Moyne College

Date submitted: 24 Jul 2006

Electronic form version 1.4