

Studying complex plasma crystal and its dynamical behavior in different plasma systems

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Since the discovery of plasma crystal by Lin I [1] and Thomas et al [2] there was a great deal of interest has been developed in studying coulomb crystal and its associated behavior using complex plasmas. This makes complex plasma an interdisciplinary field and develop the connection with soft matter and colloidal physics. In this talk the generation mechanism of plasma crystal and its melting dynamics in different plasma systems will be discussed in detail. The first-time measurement of plasma crystal in a DC glow discharge and its melting and phase coexistence were explored by changing confinement potential while keeping the global discharge and plasma parameters stationary. The phase coexistence state is quantified by investigating the global and local properties of both phases of the system during its transition. This method of controlling the coulomb crystal via confining potential provides the unique feature to study physics of structural transformation of plasma crystal without affecting the background plasma parameter which makes the problem more simplified. The analysis shows the enhanced particle interactions and longitudinal mode splitting below a threshold

confining voltage. This indicate the particle pairing as the primary driver of the phase transition as compared to previously known mode coupling instability (MCI) [3, 4]. The combined effect of MCI and wake induced particle interaction provide a more complete picture of the melting transition in a bilayer dusty plasma.

References

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