



Correlating multi-scale dynamics in 2D cold Yukawa liquids

Hao Wei Hu, Wen Wang and Lin I

Department of Physics, National Central University, Jhongli

Cooling down the liquid slightly above the freezing point. The interplay of the particle interaction and reduced thermal agitation leads to the emergence of crystalline ordered domains with different scales and stick-slip type cage rattling followed by avalanche hopping. Namely, the system exhibits structure and dynamical heterogeneities with multi-scale micro-structure and motion. In this work, we numerically investigate the multi-scale dynamics of 2D cold Yukawa liquids, through MD simulation. By using an advance adaptive algorithm, high dimensional Hilbert-Huang transform, the relative motions of adjacent particle pair exhibiting continuous spectra over a wide range of spatiotemporal scales are decomposed into intrinsic mode functions (IMFs) with different scales, and the spatiotemporal amplitude variations of different IMFs are correlated. The strong correlation between the adjacent modes followed by the gradual decay of the inter mode correlation with increasing mode number difference evidences the sequential cascading of multi-scale excitations.