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Semi-classical turbulence in a dusty plasma monolayer[1] EVDOKIYA KOSTADINOVA, RAHUL BANKA, Baylor University, JOSHUA PADGETT, University of Aransas, Baylor University, CONSTANZE LIAW, University of Delaware, Baylor University, LORIN MATTHEWS, TRUELL HYDE, Baylor University — This talk presents a theoretical study of semi-classical turbulence in a dusty plasma monolayer, where the energy cascade from large to smaller discretized vortices is guided by both spatial defects and non-local interactions. The range of vortex scales available within the dusty plasma system is defined through the participation ratio of particles in each vortex, with a dissipation scale defined by the fluctuations of individual dust grains. Spatial defects due to dust charging and non-local effects due to dust-plasma interactions result in anomalous dust particle diffusion. This introduces statistical anisotropies (preferential spatial directions) within the turbulent dynamics and deviations from Kolmogorov-like energy cascade. These processes are examined analytically using a recently developed fractional Laplacian spectral technique, which identifies the active energy channels and dissipation scales as a function of disorder and nonlocality. The predictions from the theoretical analysis are compared against results from many-body simulations of dusty plasma monolayers.

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