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Utilization of Complex Plasma in the Study of Localization Phenomena.[1] KYLE BUSSE, EVA KOSTADINOVA, LORIN MATTHEWS, CONSTANZE LIAW, TRUELL HYDE, CASPER, Baylor University — Spatial localization of waves traveling within media of sufficiently high disorder has been studied extensively due to its applicability to condensed matter physics, semiconductor physics, and material science. Complex plasma crystals exhibit characteristic distance and time scales which are easily observable by video microscopy. As such, these strongly coupled many-particle systems are ideal for the study of localization phenomena. In this work, an N-body code simulating a 2D complex plasma crystal is used as an analog for a real crystalline medium. An equilibrium state has been achieved numerically producing a crystal with highly ordered hexagonal crystalline domains. Disorder in the medium is introduced by varying the prevalence of crystalline defects, the amount of thermal coupling, or the charge variance of the dust particles. In order to generate a travelling wave in the crystal, a randomly chosen dust particle is given a Gaussian kick. A recently developed spectral method is then used to determine the presence or absence of localization. The goal of our research is to demonstrate the potential for the complex plasma crystal to act as a macroscopic tool to study localization phenomena.

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