

Abstract Submitted
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Density of States of a Two-Dimensional NIPA-Polystyrene Colloidal Crystal¹ MATTHEW GRATALE, PETER YUNKER, KE CHEN, ARJUN YODH, Department of Physics and Astronomy, University of Pennsylvania — In this work we are interested in how “dopants” affect the vibrational properties of crystals. We study the vibrational density of states of a two-dimensional colloidal crystal consisting of a mixture of hard polystyrene particles and soft NIPA microgel particles. Thus, depending on the particles involved, multiple inter-particle potentials are present in these crystals. The number ratio of hard to soft particles is varied, creating crystals consisting primarily of soft particles doped with hard particles and vice versa. We employ video microscopy to derive the phonon density of states of corresponding “shadow” crystals with the same geometric configuration and interactions as the experimental colloidal system, but absent damping [1,2,3]. Preliminary data reveal low frequency plane-like waves in all crystals, regardless of composition. Participation in higher frequency modes is often enhanced in one species of particles and diminished in the other.

[1] Chen *et al.*, PRL 105, 025501 (2010). [2] Kaya *et al.*, Science 329, 656 (2010).
[3] Ghosh *et al.*, PRL 104, 248305 (2010).

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