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Vibrational Modes in Colloidal Crystals KE CHEN, TIM STILL, Department of Physics and Astronomy, University of Pennsylvania, KEVIN APTOWICZ, Deparment of Physics, West Chester University, ARJUN YODH, Department of Physics and Astronomy, University of Pennsylvania — We investigate vibrational modes in quasi-two-dimensional colloidal crystals using video microscopy and displacement covariance matrix analysis. Debye scaling in the phonon density of states and the dispersion curve for two-dimensional hexagonal crystals are recovered for both mono-layer and double layer colloidal crystals. Using "soft spots" analysis, low-frequency quasi-localized phonon modes, which were found to coincide with fragile regions in glasses [1] appear to be spatially correlated with structural defects in colloidal crystals. Thus, "soft spots" may be a useful general identifier for defects in both crystalline and amorphous solids. This work is supported by NSF DMR 0804881, MRSEC DMR11-20901, and by NASA NNX08AO0G.

[1] K. Chen et al, Phys. Rev. Lett. 107, 108301 (2011)

Ke Chen
Department of Physics and Astronomy, University of Pennsylvania

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