

Abstract Submitted  
for the MAR17 Meeting of  
The American Physical Society

**Experimental Measurements of the Density of States for a Granular Crystal**<sup>1</sup> THIBAUT BERTRAND, Yale University Université Pierre et Marie Curie, COREY S. O'HERN, Yale University, MARK D. SHATTUCK, City College of New York — The vibrational density of states relates the structure and dynamics of materials. Several previous experimental studies have measured the density of states in colloidal glasses and identified an abundance of low energy collective excitations that give rise to anomalous behavior for the shear modulus. However, very few measurements of the density of states have been performed for driven granular materials. We report experimental investigations of the vibrational density of states of a quasi-2D uniformly heated granular crystal below the jamming density. We find that over the range of packing fractions we consider particles do not escape from their cages over the timescale of the measurements. We measure the density of states in two ways: from the power spectrum of the velocity autocorrelation function and the eigenvalues of the covariance matrix of particle displacements. We compare the experimental measurements of the density of states to results obtained from similar measurements on 2D and quasi-2D hard sphere simulations.

<sup>1</sup>W. M. Keck Foundation Science and Engineering Grant

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Date submitted: 11 Nov 2016

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