

Abstract Submitted  
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**Characterization of dilute optical lattices using pump-probe spectroscopy and photon correlation measurements** ETHAN CLEMENTS, PRESTON ROSS, ANTHONY RAPP, HONG CAI, ALEX REIGLE, ELI SCHLONSKY, HOSEONG LEE, JAMES CLEMENS, SAMIR BALI, Miami University — We experimentally investigate optical lattices using three different methods: pump-probe spectroscopy of vibrational energy levels, photon correlation of light scattered by cold atoms, and fluorescence imaging. Photon correlations of the scattered light can be used to measure lattice dwell times and crossover times between lattice sites [C. Jurczak et al., *Phys. Rev. Lett.* **77**, 1727 (1996)]. From this information we can derive the diffusion constant which can then be compared to direct measurement via fluorescence imaging. Furthermore, by Fourier transforming the time delayed photon correlations we can obtain the intensity spectrum which can be compared directly to pump-probe spectroscopy of the vibrational energy levels. We plan to carefully study situations in which the atomic transport properties deviate from Boltzman Gibbs statistics.

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