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Investigating Universal Few-body Physics based on Bose-Einstein Condensates of Cesium Atoms in Optical Lattices[1] NATHAN GEMELKE, CHEN-LUNG HUNG, XIBO ZHANG, CHENG CHIN, University of Chicago — We present progress on an experiment designed to investigate universality in few-body systems based on Bose-condensed atoms in optical lattices. In particular, we describe how collapse and revival of matter wave coherence may be used as a sensitive probe for non-binary collisions and correlations. We discuss limitations on the technique due to lattice inhomogeneity and hydrodynamic time-of-flight, and suggest remedies based on Feshbach-mediated control of interactions, and application of spin-echo techniques to matter-wave revival. To reach this goal, we have recently demonstrated Bose-Einstein condensation of 3×10^5 cesium atoms in a crossed-beam dipole trap. A novel trapping geometry is adopted which allows us to smoothly convert the crossed-beam trap to a single layer of two-dimensional (2D) lattices. The single-layer 2D lattice will allow us to directly monitor the density distribution of atoms and identify domains with different atomic populations.

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