

Abstract Submitted  
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**Experiments on a Quantum Matter Synthesizer** JONATHAN TRISNADI, MINJIAMEI ZHANG, CHENG CHIN, University of Chicago — We report progress on the construction of a “Quantum Matter Synthesizer,” a new experimental platform which will have the capability to deterministically prepare two-dimensional arrays of ultracold atoms with single site addressability. Pre-cooled cesium atoms are first transferred into a science cell via a moving lattice, and then loaded into a magic-wavelength, far-detuned 2D optical lattice. The cell is centered between two microscope objectives for single-atom imaging and projecting of optical potentials onto the atom plane. The projected potentials include a 2D triangle lattice as well as a dynamic array of optical tweezers created by a digital micromirror device to arrange atoms into a desired configuration. We provide performance updates on the transport, trapping, and cooling of atoms at the microscope focus, as well details on our implementation of moving tweezer array

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