

Abstract Submitted  
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**The Quantum Gas Microscope**<sup>1</sup> JONATHON GILLEN, WASEEM BAKR, AMY PENG, SIMON FÖLLING, MARKUS GREINER, Harvard-MIT Center for Ultracold Atoms and Dept. of Physics, Harvard University — Ultracold quantum gases are seen as models for studying questions of modern condensed matter physics because they provide a clean way of implementing fundamental Hamiltonians for complex many-body physics. In addition, they also provide novel ways of preparing the ensemble and of extracting information about the resulting many-body state from the system. We present an experiment to realize a 2D quantum gas with very high aspect ratio close to a dielectric surface as well as a 2D optical lattice geometry. The gas is positioned at the focus of a high numerical aperture optical microscope, providing a way for high resolution preparation, manipulation and analysis of the ensemble. Our novel trapping techniques allow us to generate a smooth trap and long trapping life times despite the vicinity of the substrate.

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