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Arbitrary landscape potentials under Quantum Gas Microscope for probing many-body correlated systems ALEXANDER LUKIN, RUICHAO MA, PHILIPP PREISS, MATTHEW RISPOLI, M. ERIC TAI, RAJIBUL ISLAM, MARKUS GREINER, Harvard University — We study a low-dimensional system of Rb-87 in an optical lattice under a Quantum Gas Microscope to probe strongly correlated many-body physics with single-site resolution. Controlling the potentials on the single-site level allows us to prepare and probe different many-body quantum states. We achieve such exquisite control over optical potentials using a DMD (digital mirror device) as amplitude grating. This allows for arbitrary beam shaping and compensation for aberrations in the imaging system. We use these techniques to initialize a variety of one-dimensional states and perform a full characterization of the quantum state as well as to study BEC in non-harmonic confining potentials.

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