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Probing quantum correlations in a one-dimensional bosonic system under a Quantum Gas Microscope RAJIBUL ISLAM, RUICHAO MA, PHILIPP PREISS, M. ERIC TAI, ALEXANDER LUKIN, MATTHEW RISPOLI, MARKUS GREINER, Harvard University — Characterization and direct measurement of quantum coherence in a many-body system are valuable tools to probe quantum states, especially in the context of non-equilibrium dynamics. Several schemes for directly probing entanglement in a system of ultracold atoms in an optical lattice rely on the ability to detect and manipulate atoms at a single site level. Combining the single-site resolution of our quantum gas microscope and the ability to create arbitrary optical potentials using holography, we manipulate a one-dimensional chain of Rb-87 bosons in an optical lattice with a goal to characterize the quantum entanglement. The single site addressability also allows us to access the full counting statistics in a one-dimensional system, which contains valuable information about the quantum coherence in certain systems.

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