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Extracting Dynamical Structure Factor from Cold Atom Simulator YAO WANG, Harvard University, JOANNIS KOEPSELL, Max-Planck Institute for Quantum Optics, EUGENE DEMLER, Harvard University — We propose an approach to extract the dynamical structure factors using the measurements accessible in a cold atom simulator. Through a non-equilibrium simulation using the Hubbard model with the presence of dynamical charge impurity, we mimic an optical tweezer on an optical lattice. With a quasi-orthogonal projection, we demonstrate the feasibility of extracting the dynamical charge structure factors out of the instantaneous charge distributions measurable by a quantum gap microscope. We also observe the low-energy bimagnon excitations raising from the signal with strong confining potentials, which enables the detection of dynamical spin excitations within the same measurement. With proper pumping sources, this approach can be extended to simulate other more complicated solid-state spectroscopies.

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