

Abstract Submitted
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Engineering arbitrary analog spacetime metrics in an atomic quantum gas CHENG-AN CHEN, MAY KIM, YIYANG FENG, CHEN-LUNG HUNG, Purdue Univ — We report our progress toward the construction of a quantum gas apparatus capable of engineering atomic interactions and simulating quantum fields in analog spacetime metrics with high spatial and temporal resolutions. Our experimental platform is a microscope-addressed, homogeneous two-dimensional cesium quantum gas loaded in an optical lattice. Through projecting light potential using a digital mirror device, we will perform dynamical optical Feshbach tuning of atomic interactions in an engineered spatial and temporal pattern. We describe possible explorations of a broad range of near/non-equilibrium quantum phenomena including acoustic black holes and Hawking radiations as well as quantum critical transport.

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