

Abstract Submitted
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Towards a synthetic lattice of Rydberg levels for quantum simulation JACKSON ANGONGA, BRYCE GADWAY, University of Illinois at Urbana-Champaign — Rydberg atoms in optical tweezer arrays present a versatile platform for quantum simulation, metrology and quantum information processing. We present a scheme that extends the capabilities of this platform by adding a synthetic dimension where several Rydberg levels are coupled by microwave fields to create a lattice. The near arbitrary ability to engineer a generic tight-binding Hamiltonian in the synthetic dimension, in addition to strong dipole-dipole interactions present in Rydberg atomic gases, allows new capabilities for the exploration of interaction effects in topological and disordered systems.

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