

Abstract Submitted
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Towards lattice spin models with Rydberg-dressed cesium atoms¹ OGNJEN MARKOVIC, VICTORIA BORISH, JACOB HINES, MONIKA SCHLEIER-SMITH, Stanford University — Rydberg-dressed atoms provide a versatile platform to engineer lattice spin models for studies of frustrated magnetism and quantum many-body dynamics. In our experiment, cesium atoms will be pinned in a blue-detuned two-dimensional optical lattice with a spacing continuously variable over 1-5 μm . A 320 nm laser couples ground-state cesium atoms to $n\text{P}$ Rydberg states with a single photon, enabling highly coherent and tunable interactions. We report on progress in preparing the atomic system, including optically transporting atoms with actively stabilized focus-tunable lenses from a magneto-optical trap to the optical lattice. Here, the large interatomic spacings and close optical access will facilitate single-spin-resolved imaging for detailed characterization of many-body quantum states.

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