Abstract Submitted
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Creation, Control, and Detection of Rydberg Excitations in Ultracold Strontium[1] JOSEPH WHALEN, ROGER DING, FRANCISCO CAMARGO, GERMANO WOEHL JUNIOR, F. BARRY DUNNING, THOMAS KILLIAN, Rice Univ, RICE UNIVERSITY DEPARTMENT OF PHYSICS AND ASTRONOMY / RICE QUANTUM INSTITUTE TEAM — We benchmark a new apparatus for studying Rydberg physics in ultracold gases by demonstrating the ability to create, control, and detect high-lying excitations. Two-photon transitions via the narrow 5s5p ^3P_j intercombination line, unique to alkaline-earth-like atoms, are used to create triplet 5snl Rydberg states with enhanced lifetimes that are inaccessible in alkali systems. These Rydberg excitations have strong, long-range dipolar interactions that can be tuned with principal quantum number and Rydberg fraction. To monitor n and the number of Rydberg atoms created we employ pulsed-field ionization and a microchannel plate detector. This work serves as an important milestone toward realizing many-body phenomena such as roton physics, 3D solitons, supersolidity and long-range spin models.

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