Abstract Submitted
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Molecular Spectra in an Ultracold Strontium Rydberg Gas[1]
JOSEPH D. WHALEN, FRANCISCO CAMARGO, ROGER DING, GERMANO WOEHL JR., F. BARRY DUNNING, THOMAS C. KILLIAN, Rice Univ — The interaction between a ground state atom and a highly excited Rydberg electron creates a potential that can support ultra-long-range bound molecular states comprising a Rydberg atom and several ground-state atoms. We excite these molecular states using two-photon spectroscopy in an ultracold gas of ^{84}Sr. In a thermal gas, we observe a highly structured spectrum of many-body bound states with one Rydberg atom and as many as three ground-state atoms in various vibrational levels. We also describe the spectrum in a dense, quantum degenerate gas, which is sensitive to the properties of the polaron formed by the binding of many atoms in the quantum gas to the Rydberg impurity [1]. Because of the absence of a p-wave shape resonance in e-Sr scattering, the molecular spectrum in Sr provides a sensitive probe of the excitation dynamics in a quantum gas in a different regime than is accessible using Rb [2].
[1] R. Schmidt et al, arXiv: 1510.09183
[2] M. Schlagmller et al, arXiv: 1510.07003

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Joseph D. Whalen
Rice Univ

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