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Effects of Fermi statistics on vibrationally-excited Rydberg molecules[1] ROGER DING, SOUMYA KANUNGO, JOSEPH WHALEN, HAAD RATHORE, Rice University, YU WANG, Peking University, F. BARRY DUNNING, THOMAS KILLIAN, Rice University, JOHN SOUS, University of British Columbia, HOSSEIN SADEGHPOUR, ITAMP, Harvard-Smithsonian Center for Astrophysics, MARCEL WAGNER, RICHARD SCHMIDT, Max-Planck-Institute of Quantum Optics, SHUHEI YOSHIDA, JOACHIM BURGDRFER, Institute for Theoretical Physics, Vienna University — Rydberg molecules, composed of one or many ground-state atoms bound to a nearby Rydberg atom by the scattering of the Rydberg electron, are novel tools for probing interparticle correlations due to the n^2-scaling of the Rydberg wave function length scale. We present progress towards observing the effects of Fermi statistics on the photoexcitation rates of vibrationally-excited Rydberg molecules. Focusing on the Rydberg dimers (one ground-state atom and one Rydberg atom), we compare the excitation rates from spin-polarized and unpolarized cold gases of fermionic ^{87}Sr ($I = 9/2$) to the ground and vibrationally-excited dimer states. Due to the localization of these vibrational states on length scales comparable to and smaller than the de Broglie wavelength, we expect Fermi statistics to modify these excitation rates when comparing the spin-polarized and unpolarized samples and we present spectra at $n \sim 30 - 40$ towards that goal.

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