Abstract Submitted
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Lifetimes of ultra-long-range strontium Rydberg molecules[1] F. CAMARGO, J. D. WHALEN, R. DING, Rice University, H. R. SADEGHPOUR, ITAMP, S. YOSHIDA, J. BURGDORFER, Vienna University of Technology, F. B. DUNNING, T. C. KILLIAN, Rice University — The lifetimes of the lower-lying vibrational states of ultralong-range strontium Rydberg molecules comprising one ground-state $5s^2\ ^1S_0$ atom and one Rydberg atom in the $5s38s\ ^3S_1$ state are reported. The molecules are created in an ultracold gas held in an optical dipole trap and their numbers determined using field ionization, the product electrons being detected by a microchannel plate. The measurements show that, in marked contrast to earlier measurements involving rubidium Rydberg molecules, the lifetimes of the low-lying molecular vibrational states are very similar to those of the parent Rydberg atoms. This results because the strong p-wave resonance in low-energy electron-rubidium scattering, which strongly influences the rubidium molecular lifetimes, is not present for strontium. The absence of this resonance offers advantages for experiments involving strontium Rydberg atoms as impurities in quantum gases and for testing theories of molecular formation and decay.

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