

Abstract Submitted
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Excitation of ultracold molecules to trilobite-like Rydberg states¹ MICHAEL BELLOS, RYAN CAROLLO, JAYITA BANERJEE, EDWARD EYLER, PHILLIP GOULD, WILLIAM STWALLEY, University of Connecticut — A class of long-range Rydberg molecules, sometimes called “trilobite states,” occurs when a ground-state atom is embedded in the electronic cloud of a Rydberg atom.² The bond between the Rydberg atom and the ground-state atom originates from the low-energy scattering of the Rydberg electron from the ground-state atom. We produce trilobite-like states of ultracold Rb₂ at low principal quantum numbers and at internuclear distances below 40 bohr. We populate these states through single-photon ultraviolet transitions starting from molecules in high-lying vibrational levels. This demonstrates that long-range Rydberg molecules can also be excited through bound-bound transitions, in contrast with previous studies that used free-bound transitions. We discuss the advantages of a bound-bound pathway.

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²C. H. Greene, A. S. Dickinson, and H. R. Sadeghpour, Phys. Rev. Lett. **85**, 2458 (2000).

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