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**Ultra-long-range Cs Trilobite Molecules in a Crossed 1064 nm Dipole Trap** JONATHAN TALLANT, DONALD BOOTH, JAMES SHAFFER, University of Oklahoma — Ultra-long-range molecules involving Rydberg atoms have been shown to exist in several different experimental regimes. Rydberg atom-Rydberg atom molecules have been created in the presence of bond-stabilizing electric fields at relatively low densities,  $\lesssim 10^{10} \text{ cm}^{-3}$ . In a crossed dipole trap, where the density is  $\sim 3$  orders of magnitude higher, new types of Rydberg atom molecules may be created. In particular, a novel bonding mechanism arises from the low energy scattering of a Rydberg atom electron off of a ground state atom. These so-called “trilobite” molecules can be in low or high angular momentum states. We present experimental spectra of low and high angular momentum trilobite molecules in a Cs crossed dipole trap.

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