Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

Long-range Cs Rydberg molecules[1] ARNE SCHWETTMANN, K. RICHARD OVERSTREET, JONATHAN TALLANT, JAMES P. SHAFFER, The University of Oklahoma — We present calculations of high-lying cold long-range Cs Rydberg molecules. We show bound molecular states at large interatomic distances of up to $\sim$5 microns, entirely due to avoided crossings of the Van der Waals pair-interaction potentials. These wells were found in the full set of long- range multipole Rydberg-Rydberg pair interaction potential curves calculated by our group via matrix diagonalization. The well-depths are enhanced by the application of a small (mV) background electric field. Corresponding bound state wavefunctions are analyzed. Methods to excite and observe these long-lived ($\tau > \mu$s) molecular states will be discussed. Experimental progress toward observing these novel molecular states will also be presented.

[1]We acknowledge funding from the Research Corporation, the OSRHE and the Air Force Office of Scientific Research (FA9550-05-0328).

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Date submitted: 01 Feb 2007 Electronic form version 1.4