

Abstract Submitted  
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**Rydberg Atom - Rydberg Atom Dipole-Dipole Potentials**<sup>1</sup> ARNE SCHWETTMANN, JEFF CRAWFORD, K. RICHARD OVERSTREET, JAMES P. SHAFFER, University of Oklahoma — We present numerical methods to calculate dipole-dipole interaction potential curves for Rydberg atom pairs that include a background electric field, orientational effects, and do not make use of the two-state approximation. As an example, we present dipole-dipole potentials of pairs of Cs Rydberg atoms in the 89D and adjacent electronic states for internuclear separations in the  $\mu\text{m}$  range, for a background electric field of  $\sim 28$  mV/cm as found in a typical cold Rydberg gas created in a magneto-optical trap. It is shown that an accurate calculation of dipole-dipole potentials for Rydberg atoms requires a large basis set of atom pair states.

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