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Dipole-Dipole Interactions in a Cold Cs Rydberg Gas JONATHAN TALLANT, K. RICHARD OVERSTREET, ARNE SCHWETTMANN, JAMES P. SHAFFER, University of Oklahoma — We present experimental measurements of absorption line shifts in a cold Cs Rydberg gas. The spectral line shape of Cs at n=66, 89, and 120 (p and d states) is measured as a function of Rydberg atom density. The experimental results are compared to Monte Carlo simulations. The Monte Carlo simulations use Rydberg atom interaction potentials calculated in a background electric field. The magnitude of the line shift and its dependence on Rydberg atom density indicate the onset of many-body dipole-dipole interactions.

James P. Shaffer
University of Oklahoma

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