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Electric field effects on cold Rydberg atom pair excitation ARNE SCHWETTMANN, JAMES P. SHAFFER, University of Oklahoma, VALTER A. NASCIMENTO, LUCAS L. CALIRI, LUIS G. MARCASSA, Universidade de São Paulo — We present experimental results that show a significant yield of nP atoms after excitation of nS Rb Rydberg atoms from a MOT using a pulsed dye laser, where $27 \leq n \leq 39$. Such results are naturally attributed to binary collisions. This cannot be the case here, because the interaction between Rb nS atoms is repulsive. In this experiment, the AC-Stark effect, dipole- dipole interactions, and DC Stark effect work together to create a non-vanishing final population of nP(n-1)P pairs. The background electric field and multipole interactions cause an admixture of ns-ns character into the nP(n-1)P pairs. The AC Stark shift from the laser pulse shifts the intermediate state into resonance with the nP(n-1)P final pair. We compare our results to calculations done by numerically solving the density matrix equations for a two-photon excitation of the nP(n-1)P pair state at $0.55 \leq R \leq 1.8$ microns.

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