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Population transfer collisions involving nD Rydberg atoms in a CO_2 optical dipole trap JORGE M. KONDO, LUIS F. GONCALVES, JONATHAN E. TALLANT, LUIS G. MARCASSA, Universidade de São Paulo — There has been an increasing interest in cold Rydberg atoms over the last several years. The primary reason for this attention is that interactions between Rydberg atoms are strong and lead to many interesting and useful phenomena, which require high atomic density samples. In this work, we have loaded Rb atoms into a CO_2 optical dipole trap. After the loading, we turn off the dipole trap and excite the Rydberg state using a combination of two cw laser beams at 780 nm and 480 nm respectively. Finally, the Rydberg atoms are detected using pulsed field ionization technique. By analyzing the electrons signal, we can study the population transfer from the nD state to the (n+2)P as a function of the atomic density for $37 \leq n \leq 45$. As the atomic density increases, the excitation of the nD state saturates, suggesting the occurrence of dipole blockade. Nevertheless, the (n+2)P is quadratically proportional to the nD population. We have also investigated the role of a dc electrical field in such process. This work was supported by Fapesp and INCT-IQ.

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