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Photoassociation of Rb atoms in an optical dipole trap[1] CARLOS MENEGATTI, BRUNO MARANGONI, University of Sao Paulo, NADIA BOULOUFA, OLIVIER DULIEU, Laboratoire Aim Cotton, Universit Paris-Sud, LUIS MARCASSA, University of Sao Paulo — Laser cooling and trapping techniques are nowadays routinely used to produce atomic samples at temperatures around 1 mK or below. An old ambition in this research field is the direct application of such techniques to molecules, however due to the absence of closed optical transitions in molecules this is not straightforward. Nevertheless, cold and dense atomic trapped samples can be used to produce cold molecules trough photoassociation. In our experiment, we have trapped Rb atoms in a crossed broadband optical dipole trap. Our crossed beam configuration uses 25 W of power (at 1064 n, bandwidth of 2 nm) in each beam with about 50 micron waist radius at the focus and a depth of about 700 μK. In the typical condition, we have about 3×10^6 trapped atoms at a density of 3×10^{12} cm^{-3}. We have observed that the Rb atom population presents a non-exponential decay in such a trap. We believe that such observation suggests that the sample is been photoassociated by the 1064 nm laser, forming an excited state Rb_2 molecule, which further decays forming Rb_2 in the ground state. The results are compared with a theoretical model.

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