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Rovibrational optical cooling of Rb_2 in a supersonic beam¹ MANUEL ALEJANDRO LEFRAN TORRES, HENRY FERNANDES PAS-SAGEM, CRISTIAN MOJICA-CASIQUE, EDUARDO DA COSTA PAUL, MAR-COS ROBERTO CARDOSO, LUIS MARCASSA, Sao Carlos Institute of Physics at the University of Sao Paulo — In this work, we propose to optically cool the rotation and the vibration of Rb_2 molecules in a supersonic beam by applying a broadband light source. Such source consists of a tapered amplifier laser with frequency-shifted feedback, around 682 nm, which can drive transitions from $\nu_x, J_x X^1 \Sigma_g^+$ ground state to the $b^1 \Pi_u$ excited potential. The spectrum of our source is such that the $\nu_x, J_x = 0 X^1 \Sigma_g^+$ ground state will be a dark state. The molecules will be observed by photoionization technique, through transitions from the ν_x, J_x to ν, J_x of the $b^1 \Pi_u$ potential using a CW diode laser, and then photoionized by a 532 nm pulsed laser. Such technique will allow us to resolve the rotational distribution of the $\nu_x = 0$. Theoretical simulations indicate that we should be able to perform the rovibrational cooling in less than 300 μ s.

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