Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Continuous Vibrational Cooling of Ground State Rb_2 JONATHAN TALLANT, LUIS MARCASSA, Instituto de Física de São Carlos, Universidade de S ao Paulo — The process of photoassociation generally results in a distribution of vibrational levels in the electronic ground state that is energetically close to the dissociation limit. Several schemes have appeared that aim to transfer the population from the higher vibrational levels to lower ones, especially the ground vibrational state. We demonstrate continuous production of vibrationally cooled Rb_2 using optical pumping. The vibrationally cooled molecules are produced in three steps. First, we use a dedicated photoassociation laser to produce molecules in high vibrational levels of the $X^1\Sigma_g^+$ state. Second, a broadband fiber laser at 1071 nm is used to transfer the molecules to lower vibrational levels via optical pumping through the $A^1\Sigma_u^+$ state. This process transfers the molecules from vibrational levels around $\nu \simeq 113$ to a distribution of levels where ν <35. The molecules may then be further cooled using a broadband superluminescent diode near 685 nm that has its frequency spectrum shaped. The resulting vibrational distributions are probed using resonance-enhanced multiphoton ionization with a pulsed dye laser near 670 nm. The results are presented and compared with theoretical simulations. This work was supported by Fapesp and INCT-IQ.

Luis Marcassa
Instituto de Física de São Carlos, Universidade de S ao Paulo

Date submitted: 31 Jan 2014 Electronic form version 1.4