Universidade Federal da Paraíba
Centro de Ciências Exatas e da Natureza
Programa de Pós-Graduação *Stricto Sensu* em Física

Colóquio

"Production and trapping of v = 0 ultracold molecules by a high-power light beam"

RESUMO: Photoassociation of a pair of ultracold atoms is a quite simple and rapid approach for cold molecule formation. It relies on the absorption of a single photon, mostly at large internuclear distance in a classical view, towards an excited electronic molecular state followed by radiative relaxation down to the electronic ground state. The main limitation of PA is that the latter step is incoherent, so that the population of the created molecules is spread over many vibrational levels with weak or moderate binding energies. If the excited electronic molecular state exhibits a peculiar feature at short internuclear distance like a potential barrier or an avoided crossing, the population of deeply-bound ground state levels may be significantly enhanced. In this work, the influence of a high-power fiber laser on the formation and trapping of ultracold 85Rb2 molecules is investigated as a function of its frequency (in the 1062-1070 nm range) in a magneto optical trap. We found evidence for the formation of ground state 85Rb2 molecules in low vibrational levels (v ≤ 20) with a maximal rate of 104 s-1, induced by short-range photoassociation by the fiber laser followed by spontaneous emission. When this laser is used to set up a dipole trap, we measure an atomic loss rate at a wavelength far from the PA resonances only 4 times smaller than the one observed at a PA resonance wavelength. This work may have important consequences for atom trapping using lasers around the conventional 1064 nm wavelength.

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Local: Auditório I do DF (prédio novo)	