INVESTIGATION OF EXOERGIC COLLISIONS IN MIXED SPECIES TRAP: Na/Rb, Na/K, Rb/K

V. S. BAGNATO, L. G. MARCASSA, G. D. TELLES, S. R. MUNIZ, A. A. PEREIRA, *Instituto de Física de São Carlos, Universidade de São Paulo - Caixa Postal 369, 13560-970 - São Carlos - SP - Brasil.*

Using magneto optical trapping that simultaneously trap two different atomic species, we have performed experiments where trap loss due to the crossed specie effects are investigated. Our MOT operates in a room temperature vapor cell which can produce traps with spatial overlapping of two of any of the alkalis Na, K, Rb, Cs. To investigate the cross species cold collisions we use the traditional transient behavior technique where either the loading or unloading of the MOT is observed for a simple or double specie trap. Measurements of the trap loss rate as a function of intensity show the existence of alternative mechanisms for the exoergic collisions. A catalysis experiment was also performed two complement the understanding of the observed trap loss rates.

Defining β as the trap loss rate for Na alone and β' the loss rate for Na due to collisions with Rb, the behavior of β and β' as a function of Na trap laser intensity is shown in fig.1. As the laser intensity decreases (so does the trap depth), β decreases while β' increases. This behavior is consistent with the fact that the main contribution to β' are collisions of the type $Na - Rb^*$. This behavior is confirmed by the catalysis data where the dependence of β' with intensity is very gentle. Other combinations of atoms indicate peculiar behavior inherent to each individual systems. Most the observation involving cross species exoergic collisions can not be explained using simple models. Studies involving mixed species cold collisions may find important applications towards the production of mixed Bose-Einstein Condensation.