

Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

An observation of a series of single and multi photon molecular transitions¹ JEONGHUN LEE, TOM GALLAGHER, Univ of Virginia — Microwave transitions between pair states composed of two Rb Rydberg atoms in a magneto-optical trap are investigated. This is an extension of the experiment that investigated the transition from $ndnd$ to $(n+1)d(n-2)f$ state. The aforementioned transition is allowed because $(n+2)p(n-2)f$ state that is energetically close to $ndnd$ state gets admixed into $ndnd$ state as a result of the dipole-dipole induced configuration interaction. The microwave transition is from the $(n+2)p(n-2)f$ part of the wavefunction to the $(n+1)d(n-2)f$ state. In the transition, the microwave drives a transition from $(n+2)p$ to another state in one atom with the other atom remaining a spectator in the $(n-2)f$ state. A series of one, two, and three photon molecular transitions that occur due to the same mechanism was observed. Those are transitions from $ndnd$ to $(n+3)s(n-2)f$, $(n+3)p(n-2)f$, $nf(n-2)f$, and $(n+4)s(n-2)f$. In addition, molecular transitions during which the microwave drives a transition from $(n-2)f$ to another state in one atom with the other atom remaining a spectator in the $(n+2)p$ state were also observed. The molecular transitions of this type that were observed are $ndnd$ to $(n+2)p(n-1)d$ and $(n+2)p(n-1)f$. The measured transition frequencies were found to agree well with the calculated values.

¹This work has been supported by the Air Force Office of Scientific Research.

Jeonghun Lee
Univ of Virginia

Date submitted: 29 Jan 2016

Electronic form version 1.4