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A study of adiabatic population transfer for the production of heavy Rydberg systems JEFFREY PHILIPPSON, RALPH SHIELL, Trent University — We present recent progress towards the production of heavy Rydberg systems within alkali metal dimers using STIRAP to effect vibrational state transfer followed by excitation with a pulsed UV laser. We have calculated the efficiency of adiabatic population transfer in a 2-level system and investigated its dependence on the temporal profile of the perturbation. We show that the optimal profile for adiabatic following results in a significantly lower probability of a non-adiabatic transition than that predicted by applying the Landau-Zener formula. We have also determined the relationship between population-loss and beam profile for a 3-level system undergoing a STIRAP process. These theoretical predictions will be compared with results from a molecular beam experiment within which lithium dimers cross beams from a pair of diode lasers tuned to the $A^1\Sigma_u^+$ - $X^1\Sigma_g^+$ transition.

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