

Abstract Submitted  
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**Velocity Changing Collisions and Optical Pumping in Ultracold Neutral Plasmas** JOSE CASTRO, THOMAS KILLIAN, Rice University — The rate of velocity changing collisions in Strontium Ultracold Neutral Plasmas (UNP) was measured through optical pumping between the two ground level spin states. The spin states of the ground and excited levels of a Sr ion form a  $\Lambda$  energy configuration when coupled with the appropriate circularly-polarized light. The evolution of the population of such energy states is strongly affected by collisions between ions. Fluorescence measurements of optical pumping into the “dark” ground level spin state show that velocity changing collisions between ions slow down the pumping rate. A set of coupled rate equations is used in combination with the fluorescence measurements to model the energy level population and to calculate the ion- collisional frequency.

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