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**Velocity dependence of the Cs($5D$) + Cs($6P$) $\rightarrow$ Cs($7D$) + Cs($6S$) energy pooling process**[1] S. SWEENEY, J. HUENNEKENS, Lehigh U., A. MARKS, Bryn Mawr College — We describe recent progress on an experiment using molecular photodissociation to study the velocity dependences of atomic collision processes in a vapor. Fast Cs($5D$) atoms with well defined velocities are created via the molecular photodissociation process $Cs_2 + h\nu \rightarrow Cs(6S) + Cs(5D) + \Delta E$. The speed of the $5D$ atoms is controlled by the pulsed photodissociation laser frequency, and the speed distribution is measured as a function of time by scanning a cw probe laser over the $5D \rightarrow 5F$ Doppler-broadened line shape. As time progresses, the initial non-thermal $5D$ velocity distribution relaxes toward the thermal Maxwell-Boltzmann distribution, and the measured line shapes are used to determine thermalization rates. In our recent work, we add to the vapor a large thermal population of Cs($6P$) atoms (created using a cw laser), and measure the $7D$ fluorescence (due to $5D + 6P \rightarrow 7D + 6S$ energy pooling) in the early time before the fast $5D$ atoms thermalize. We obtain a relative measure of the energy pooling cross section by dividing the $7D$ signal by measures of the steady-state $6P$ density and the transient $5D$ density. By then varying the photodissociation laser frequency we can map the relative velocity dependence of the energy pooling cross section. Our preliminary results indicate that a significant velocity dependence does exist, but further work is required to verify these results.

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