

IMAGING OF ELECTRONICALLY INELASTIC COLLISIONS.

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We have investigated the elastic and inelastic scattering in the $\text{Cl} + \text{D}_2$ system as a probe of the coupling between $\text{Cl} (^2\text{P}_{3/2}) + \text{D}_2$ potential energy surface and the $\text{Cl}^* (^2\text{P}_{1/2}) + \text{D}_2$ potential energy surface. Our experiments utilize a newly constructed cross molecular beam machine with velocity map ion imaging detection to probe all scattering into the $\text{Cl}^* (^2\text{P}_{1/2})$ channel at a collision energy of 1700 cm^{-1} . Collisions between $\text{Cl} (^2\text{P}_{1/2})$ which result in a non-adiabatic transition to the upper spin-orbit potential energy surface must partition 881 cm^{-1} ($=E_{S.O.,Cl}$) less energy into relative translation. Our ion images show no evidence of such spin-orbit changing collisions in the $\text{Cl} + \text{D}_2$ system and allow for an estimate of the total cross section for such collisions.