IMAGING OF ELECTRONICALLY INELASTIC COLLISIONS.

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We have investigated the elastic and inelastic scattering in the Cl + D_2 system as a probe of the coupling between Cl $(^2P_{3/2})$ + D_2 potential energy surface and the Cl* $(^2P_{1/2})$ + 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 Cl* $(^2P_{1/2})$ channel at a collision energy of 1700 cm^{-1}. Collisions between Cl $(^2P_{1/2})$ 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 Cl + D_2 system and allow for an estimate of the total cross section for such collisions.