A LASER PUMP-DISPERSED FLUORESCENCE PROBE APPROACH TO INELASTIC SCATTERING IN S_1 GLYOXAL AT VARYING COLLISION ENERGIES

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A laser pump-dispersed fluorescence probe approach has been used to monitor state-to-state inelastic scattering from S_1 (^1A_u) *trans*-glyoxal in crossed molecular beams. The trio of collision partners H_2, He, and D_2 provided the unique opportunity to explore the relative influences of the center-of-mass collision energy (E_{cm}) versus the interaction potential energy surface (PES). The PES for glyoxal + H_2 (E_{cm} = 650cm^{-1}) and D_2 (770cm^{-1}) are identical but the relative cross sections are vastly different. In contrast, when the kinematics were matched, as in the case for glyoxal + He (770cm^{-1}) and D_2 (770cm^{-1}), the distribution of cross sections were nearly identical. These observations indicate that the collision kinematics dominate inelastic scattering while the details of the PES play a minor role. The experiments presented here were designed to investigate this kinematic control by selectively controlling the relative velocity and thus the center-of-mass collision energy and momentum.