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Stark Slowing Asymmetric Rotors: Weak Field Seeking States and Nonadiabatic Transitions ARNE SCHWETTMANN, JACK FRANKLIN, K. RICHARD OVERSTREET, JONATHAN TALLANT, JEFF CRAWFORD, JAMES P. SHAFFER, University of Oklahoma — We present calculations of Stark shift curves for several small asymmetric rotors, including a quantitative analysis of nonadiabatic transition probabilities and orientational distribution functions, applicable to typical Stark slowing conditions. Stark deceleration is one of the few methods that can be used to slow polyatomic molecules. In a Stark slower, the Stark effect is exploited to create a force that can decelerate molecules. To date, Stark slowing has focused on diatomic and symmetric top molecules. Asymmetric rotors have received relatively little attention although they are the most common type of molecule in nature. Asymmetric polyatomic molecules can be Stark slowed if they have large enough dipole moments, but can exhibit quite different orientational behavior than their symmetric counterparts. Nonadiabatic transition probabilities are key to Stark slowing applications, because the transition can convert a weak field seeking state into a strong field seeking state. Nonadiabatic transitions occur as a result of the breakdown of the adiabatic approximation in energy regions where two Stark curves approach each other. To assess effective nonadiabatic transition probabilities, a semi-classical approach is used.

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