## PENDULAR STATES AND IVR

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There has been long-term interest in developing methods to align or orient molecules to study steric effects in collisions. Recently, Friedrich and Herschbach and Loesch and Remsheid have explored the use of large static electric fields to "brute-force" orient linear molecules. For molecules excited to regions of high vibrational state density where intramolecular vibrational energy redistribution (IVR) occurs, additional complications need to be considered when designing experiments which require that the excited molecules be aligned or oriented. We have recently shown, for example that a molecule excited to a single molecular eigenstate in regions of high state density is no longer deflected by inhomogeneous fields when the mean spacing between vibrational levels in on the order of the mean molecule-field interaction strength. The present talk explores theoretically the consequence of using "brute force" orientation techniques for molecules excited to regions where IVR is important. The molecule HCCF is chosen as a model system for this study since the anharmonic force field is well characterized, allowing a realistic description of the energy levels and couplings in the high-density-of-states regime. Our results show rapid dephasing of the orientation, even in the absence of any explicit Coriolis coupling of the vibration and rotational degrees of freedom. We find that the effect is induced by nonadiabatic couplings of the pendular ladders built upon different vibrational states. The nonadiabatic couplings require that the rotational constants or dipole moments differ between vibrational states in order that the pendular wavefunctions be nonorthogonal. The present results suggest that the orientation lifetime will be similar to the IVR lifetime when the "brute-force" approach is used to orient molecules in regions of high vibrational state density.