QUANTUM BEAT SPECTROSCOPY OF DIATOMIC TRANSIENTS

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Quantum beat spectroscopy is a method for sub-Doppler spectroscopy which provides lifetime limited linewidths and so is ideally suited to the precise measurement (typically $+/-$ 0.1 MHz) of small splittings ($<$100 MHz). Quantum beat spectroscopy has been applied for the first time to $^3\Pi$ states of transient diatomics. The reactive species are produced in a supersonic free jet using a electric discharge and quantum beats observed between hyperfine levels or Zeeman split levels from a small applied magnetic field. Magnetic g factors, including their vibrational dependence, have been determined from the Zeeman beats for both the $A^3\Pi - X^3\Sigma$ transition of NH and the $B^3\Pi - A^3\Sigma$ transition of N_2*. A perturbation in the higher vibrational levels of NH was observed to have a strong effect on the Zeeman tuning.