LOW TEMPERATURE MILLIMETER WAVE DOUBLE RESONANCE OF METHYL FLUORIDE

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We have recently undertaken an investigation of molecular collision processes employing time resolved double resonance techniques. A millimeter wave - millimeter wave double resonance experiment becomes possible at low temperatures where, unlike at room temperature, a millimeter wave pump can induce large deviations from the thermal population distribution. We use the collisional cooling method to cool molecules to very low temperatures (around 4 K). Resonances, which result from quasi-bound states, dominate low temperature pressure broadening cross sections and also contribute to low temperature rotational energy transfer. In our first experiments, we have measured state-to-state energy transfer rates for methyl fluoride (collisionally cooled by helium). We compare the pressure dependence of these rates with measured pressure broadening data.