TIME RESOLVED STUDIES OF LOW TEMPERATURE INELASTIC COLLISIONS: H_2S-He

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Rotationally inelastic cross sections of H_2S-He collisions at low temperature (1-20 K) have been measured using time resolved millimeter wave absorption techniques with a collisional cooling cell. Data from this experiment are compared with low temperature pressure broadening data to illuminate the relative roles of elastic and inelastic collisions in low temperature broadening. At ambient temperatures, microwave pressure broadening can be attributed to inelastic processess, while at low temperatures we have found that elastic collisions are dominant. This is due in part to the lack of available kinetic energy to excite a collision-induced rotational transition as well as the resonant formation of quasi-bound complexes at low collision energy. Data from this type of experiment can be used by astrophysicists to model the behavior of molecules in the non-equilibrium environments of interstellar clouds.