

## ROTATIONAL TEMPERATURE OF METHANE IN SUPERSONIC MOLECULAR BEAM

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Rotational temperature of methane in supersonic molecular beam was claimed to be about 10 ~ 40 K in various conditions. It was found that distribution of the three nuclear spin modifications do not change during the supersonic cooling. A strong deviation from thermal equilibrium was also observed. We re-investigated the rotational temperature of methane by the rovibrational transitions of the  $\nu_3$  vibrational band. An infrared spectrometer with cw-OPO laser was used for the observation. The rotational temperature of CH<sub>4</sub> derived from transitions up to  $J = 2$  was 10 K, consistent with the rotational temperature derived for the OCS molecule. Much higher rotational temperature (~ 70 K) with large diversity was obtained for higher  $J$  transitions of CH<sub>4</sub>, which could be attributed to the incomplete relaxation of rotational-level distribution of light molecule as CH<sub>4</sub>, a similar situation as the vibrational-level distribution in supersonic molecular beam.