VIBRATIONALLY HOT HCN IN THE LABORATORY AND IRC+10216

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HCN has historically been used as a tracer of the dense gas in the in interstellar medium. The envelopes of carbon rich asymptotic giant branch stars are generally rich in HCN; however, the large and generally variable infrared flux emitted by the star enormously complicates the interpretation. HCN in IRC+10216 shows an enormous number of masers and lasers pumped by the central star and often enhanced by line overlaps with other abundant molecules such as acetylene in the infrared. A total of seven laser transitions including two previously unreported transitions associated with the $040 - 011$ interacting bands have been observed. To understand the astronomical observations a study of the radio frequency discharge plasma of CH_4 and N_2 was performed. Rotational transitions of HCN in vibrational states up to 15,000 cm^{-1} have been observed including inverted levels and a number of previously undetected states. The spectra from IRC+10216 and the laboratory are presented.

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