OBSERVATION OF THE CH STRETCH BAND OF CH_5^+

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Ab initio calculations predict that protonated methane, CH_5^+, has three low energy structures that are practically equal in energy and that barriers separating their 120 equivalent minima are low[a]. Thus CH_5^+ provides a new prototype of spectroscopic specimen in which the five equivalent protons are attached to the central carbon atom[b]. We have observed, using our difference frequency spectrometer and the velocity modulation technique, a weak but rich spectrum of a carbocation containing one carbon. We believe they are transitions of CH_5^+ due to the formally forbidden CH stretch band based on their plasma chemical behavior and agreement with the conclusion of predissociation spectroscopy of CH_7^{+}[c]. A preliminary observational result will be reported.

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[c] D. W. Boo and Y. T. Lee, *Chem. Phys. Lett.* **211**, 358 (1993)