

Resonance enhanced multiphoton ionization and time of flight mass analysis of C₂H₂

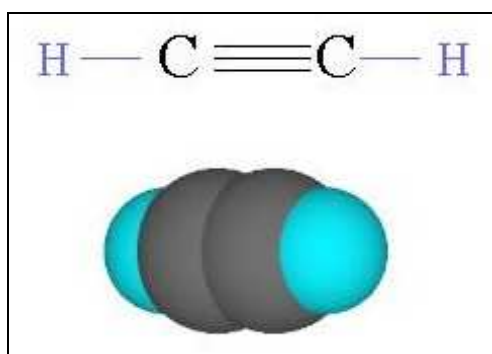
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Abstract.

Resonance-Enhanced-Multiphoton-Ionisation (REMPI) is a method which uses high intensity laser beams to ionize molecules after resonance enhanced excitation to neutral states. Samples are formed by jet cooling. Ions are detected by Time-of-Flight (TOF) mass spectrometer. Molecular spectra are obtained by sampling ion yields as function of laser frequency (REMPI-TOF spectra).

Analysis of ion formations as a function of laser excitation frequency for acetylene (C₂H₂) were performed. Resonance transitions via molecular Rydberg states are detected. H⁺, C⁺, C²⁺ and C₂H₂⁺ ions are formed in different proportions as the LASER frequency alters. Data analysis allows characterization of Rydberg states by help of quantum simulation calculations. An ionization mechanism is proposed from analysis of the ion formation pattern and further supported by DFT theoretical calculations.



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