HIGH-RESOLUTION IR ACTION SPECTRUM OF $C_2H_2^+$

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The method of Laser-Induced-Reactions (LIR), which is described in detail in Schlemmer et al. 2002[a], is used to obtain high-resolution infrared spectra of molecular ions. Here, the endothermic reaction $C_2H_2^+ + H_2 \rightarrow C_2H_3^+ + H$ is promoted by ro-vibrational excitation of the parent ion. A spectrum of the ν_3 stretching vibration of $C_2H_2^+$ is recorded by variation of the wavelength of a home-build OPO (Optical Parametric Oscillator) operating in the 3 micron region. The experiments are carried out in a low temperature 22-pole ion trap where several hundred cold, mass selected parent ions are stored. Typical linewidths of the action spectra are 3×10^{-3} cm^{-1}. First spectra for $C_2H_2^+$ and their analysis will be presented. Other possible applications of LIR spectroscopy will be discussed.

[a] S. Schlemmer, E. Lescop, J. von Richthofen, D. Gerlich, and M. Smith, Laser Induced Reactions in a 22-Pole Ion Trap: $C_2H_2^+ + H_2 \rightarrow C_2H_3^+ + H$, *J. Chem. Phys.* **117**(2068-2075), 2002