WIDELY TUNABLE UV/VIS CAVITY-ENHANCED ULTRAFAST SPECTROSCOPY AND EXCITED STATE PROTON TRANSFER IN JET-COOLED MOLECULES AND CLUSTERS

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Ultrafast optical spectroscopy methods, such as transient absorption spectroscopy and 2D spectroscopy, are typically restricted to optically thick samples, such as solids and liquid solutions. We have developed a technique, Cavity-Enhanced Ultrafast Spectroscopy, to study dynamics in a molecular beam with femtosecond temporal resolution. By coupling frequency combs into optical cavities, we previously demonstrated ultrafast transient absorption measurements with a detection limit of $\Delta\text{OD} = 2 \times 10^{-10}(10^{-9}/\sqrt{\text{Hz}})$.[a] In this talk, I will present a widely tunable version of this spectrometer operating at probe wavelengths between 450 and 700 nm (8000 cm^{-1}) using only one set of dispersion managed cavity mirrors. The tunable probe comb is generated using an intracavity doubled optical parametric oscillator. I will discuss the technical details of this spectrometer and its application to the dynamics of excited state intramolecular proton transfer (ESIPT) in jet-cooled molecules and clusters.

[a]M. A. R. Reber, Y. Chen, and T. K. Allison, Optica **3**, 311 (2016)