CAVITY ENHANCED ULTRAFAST TRANSIENT ABSORPTION SPECTROSCOPY

THOMAS K ALLISON, *Department of Chemistry, Stony Brook University, Stony Brook, NY, USA*; MELANIE ROBERTS REBER, *Department of Physics and Astronomy, State University of New York, Stony Brook, NY, USA*; YUNING CHEN, *Department of Chemistry, Stony Brook University, Stony Brook, NY, USA*.

Ultrafast spectroscopy on gas phase systems is typically restricted to techniques involving photoionization, whereas solution phase experiments utilize the detection of light. At Stony Brook, we are developing new techniques for performing femtosecond time-resolved spectroscopy using frequency combs and high-finesse optical resonators. A large detection sensitivity enhancement over traditional methods enables the extension of all-optical ultrafast spectroscopies, such as broad-band transient absorption spectroscopy (TAS) and 2D spectroscopy, to dilute gas phase samples produced in molecular beams. Here, gas phase data can be directly compared to solution phase data. Initial demonstration experiments are focusing on the photodissociation of iodine in small neutral argon clusters, where cluster size strongly influences the effects solvent-caging and geminate recombination. I will discuss these initial results, our high power home-built Yb:fiber laser systems, and also extensions of the methods to the mid-IR to study the vibrational dynamics of hydrogen bonded clusters.