Terahertz Collective Dynamics of Biopolymers in Water: THz Absorption and Circular Dichroism Spectroscopy

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Abstract:
Biopolymers are expected to exhibit broad spectral features in the terahertz frequency range (1 THz = 1 ps), corresponding to their functionally relevant, global and sub-global collective vibrational motions. Recent advances in terahertz source and detection methods have stimulated experimental researchers to employ terahertz absorption spectroscopy to directly probe and confirm these postulated collective vibrational modes. However, these pioneering studies have been limited to dry and, at best, moist samples. Successful isolation of the low frequency vibrational activities of solvated biomolecules in their natural water environment has remained elusive, due to the overwhelming attenuation of the terahertz radiation by water.

Motivated by the importance of terahertz dynamics in biology, and the limited experimental efforts to probe them in physiologically relevant conditions, my graduate studies have focused on the development of a broad band terahertz spectrometer suitable for studying biopolymers in aqueous solutions using both direct absorption and circular dichroism spectroscopy. I will discuss the first measurements of terahertz absorptions of prototypical proteins in solution, its comparison with current theory models, and the status of our work in recovering terahertz circular dichroism signatures of solvated biopolymers.

Date: 2pm, Monday, August 28, 2006.

Location: 3302 Broida (Third Floor Conference Room).

Category: Thesis Defense.

Snacks: Yes.