

Fall 2024 Physics Colloquium

Friday, November 15, 2024

3:00 PM

PAS 201 or Zoom

(<https://arizona.zoom.us/j/81283840289>)

Niranjan Shivaram

Purdue University



Ultrafast Electron Dynamics Measured with Ultrafast Field Observables

Abstract: Electron dynamics in matter typically occur on time scales ranging from femtoseconds to attoseconds. Such ultrafast dynamics can be 'strobed' using femtosecond and attosecond laser pulses. The optical technology to generate and measure attosecond pulses received the Physics Nobel Prize in 2023. Numerous measurement approaches have been developed over the past three decades to track electron dynamics using these ultrashort pulses. Nonlinear optical wavemixing spectroscopy such as four-wave mixing spectroscopy is a powerful approach to measure ultrafast dynamics because it could provide access to detailed information such as transient electronic symmetries in molecules. In this talk, I will describe our recent work where we combined femtosecond electric field measurement with four-wave mixing spectroscopy to demonstrate the sensitivity of field observables to electronic symmetries in molecules. I will then present preliminary results of transient absorption spectroscopy experiments involving femtosecond vacuum-ultraviolet pulses and near infrared pulses in electronically excited molecules. Finally, I will conclude by briefly discussing a new direction of research in my group to generate entangled photons in the extreme-ultraviolet regime as a novel source for attosecond spectroscopy.

** Refreshments served in PAS 218 at 2:30 PM – 3:00 PM **

