

# Spring 2025 Physics Colloquium

Friday, February 28<sup>th</sup>

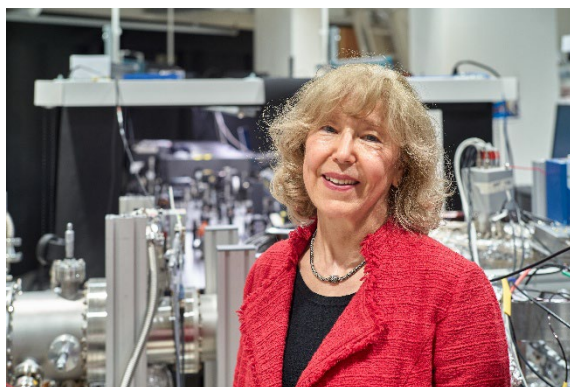
3:00 PM

PAS 201 or Zoom

(<https://arizona.zoom.us/j/86395646910>)

## Nora Berrah

University of Connecticut



## Ultrafast Molecular Dynamics at the Femtosecond and Attosecond Timescale

**Abstract:** The knowledge of the earliest time dynamics in molecular photophysics and photochemistry is critical to understand how the energy from photons is harnessed, initiating electronic and nuclear motion which is fundamental in many areas of science. Our goal is to understand the coupled electronic and nuclear dynamics induced by the absorption of photons by molecules, which leads first to attosecond electron excitation, followed by nuclear motion in the femtosecond range. This eventually results in the breaking and making of chemical bonds.

Table-top lasers as well as the development of free electron lasers (FELs) in the femtosecond and attosecond regime have led to new science. I will present time-resolved experiments using pump-probe technique with FELs to watch the response of molecules to femtosecond and attosecond pulses. I will also briefly report on a roaming experiment in acetonitrile carried out with table-top femtosecond IR laser combined with coincident Coulomb explosion imaging and paired with state-of-the-art theoretical simulations. This work focused on measuring unambiguously the roaming of D<sub>2</sub> neutrals and the formation of D<sub>3</sub><sup>+</sup> ions from acetonitrile.

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

