Dept. of Physics & Engineering Physics
Fall 2021 Physics Colloquium Series

*Lindy Boggs Energy Center, Rm. 240*
*Monday, November 1, 03:00-04:30 pm*

# *How to watch electrons move inside molecules by using ultrafast light sources*

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Ultrafast science has reached the natural, attosecond, time scale of electron dynamics, with routine generation and application of attosecond pulses of light. These light pulses can be used both to initiate ultrafast dynamics in a quantum systems and also to probe how it evolves. An example of such dynamics is charge migration in molecules, which has recently attracted a lot of interest in the ultrafast community. Charge migration is a coherent back-and-forth motion of electrons following the creation of a localized hole at one end of the molecule by rapid ionization, and it is considered a precursor to more permanent structural or chemical changes. In this talk, I will give an overview of how to use ultrafast light pulses to probe electron dynamics in general, and I will focus in particular on our recent theory efforts on how to characterize and probe charge migration in molecules.

*Dr. Mette Ggarde is a Les and Dot Broussard Alumni Professor of Physics at the LSU's Dept. of Physics & Astronomy. She has received her Ph.D. in 1997 from University of Copenhagen, Denmark. Prof. Gaarde's research program is centered around probing and controlling the ultrafast laser-matter interactions in atomic, molecular, and condensed-phase systems, involving a wide range of ultrafast dynamics. The studies include both the production and application of attosecond and femtosecond pulses of coherent VUV and XUV light, and lies in the interface between ultrafast AMO science and extreme non-linear optics. Attosecond pulses, which are generated through the extremely nonlinear process of high harmonic generation (HHG), are the shortest bursts of light ever produced and allow for probing and controlling the dynamics of bound electrons on their natural time scales.*