

University of Louisville  
Department of Chemistry

## Adam Kinyua Literature Seminar

When: September 22, 2022

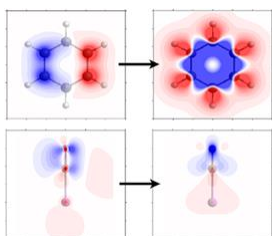
Time: 2:30 p.m.

Location: CBL-16

# Understanding and controlling Electronic Dynamics in Molecular systems at the attosecond timescale

### Abstract:

Currently, scientists can investigate ultrafast electronic processes in atoms and molecules, thanks to attosecond science and the principles of light-matter interaction. Simple systems have received more attention as they are easy to work with. However, there has been an increasing interest in whether the new technology can be used to sufficiently investigate electron dynamics within larger systems such as amino acids. This talk encompasses three sections: the application of attosecond laser pulses to break and heal electron symmetry, tracking charge migration in phenylalanine using attosecond laser pulses, and the laser-like effects of a dipole-bound electron on a dipole-bound state. Sometimes employment of laser pulses in system manipulation may bring about unwanted consequences such as breaking the electron symmetry, which is crucial in spectroscopy. The first section of the talk will ensure we are up to date on the best to break and mend electron symmetry. Secondly, I will discuss what happens when an amino acid is ionized using attosecond laser pulses; does the charge remain in a particular location of the system, or is it free to roam across the cation skeleton? Finally, I will discuss what happens when an anion in a dipole-bound state loses the diffuse electron, which is believed to have no effects on the nature of the neutral core orbitals when the system undergoes photodetachment. The observed laser-like effects were unexpected, which shows that diffuse electrons can be used in some situations to study effects analogous to those produced by laser pulses.



Restoration of broken electron symmetry in Benzene and LiCN

### References:

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Calegari, F., Ayuso, D., Trabattoni, A., Belshaw, L., de Camillis, S., Anumula, S., Frassetto, F., Poletto, L., Palacios, A., Decleva, P., Greenwood, J. B., Martín, F., & Nisoli, M. (2014). Ultrafast electron dynamics in phenylalanine initiated by attosecond pulses.

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