

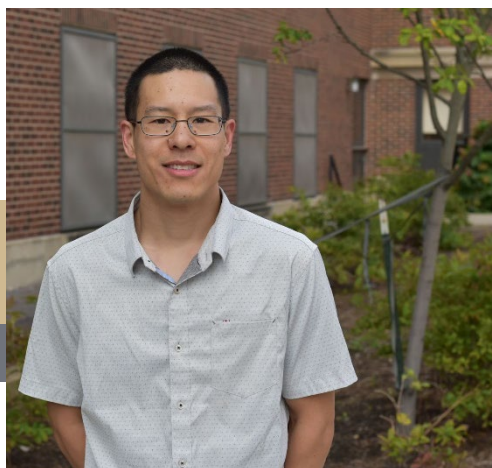
ANALYTICAL SEMINAR

Shining New Light on Highly Symmetric Molecules

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Probing and Manipulating quantum states of protons, atoms, and simple molecules with electromagnetic fields underpins our modern understanding of the physical world as well as MRI, masers, atomic clocks, and emerging quantum technologies such as quantum computers, sensors, and emitters. Over the past few years my work has centered on extending these capabilities to another class of matter: highly symmetric molecules like buckminsterfullerene (C₆₀). C₆₀'s unique symmetry and degrees of freedom may prove advantageous for quantum information processing, sensing, and more. However, its unusually high symmetry also makes it optically dark, rendering most of the molecular state space inaccessible to standard high resolution spectroscopic techniques. I will talk about recent results on laboratory spectroscopy of gas phase C₆₀, including insights into its structure, dynamics, and interactions obtained by probing one of its rare infrared-active vibrational modes. C₆₀ is now the largest and most symmetric molecule for which total quantum state resolution has been achieved, and a prime candidate for ushering molecules with more than ~ten atoms into the quantum era. Finally, I will touch on future plans here at Purdue: opening up the rest of the molecular state space for advancing quantum science and technology.



Tuesday, January 14, 2025



3:30 pm



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