CHEMISTRY & BIOCHEMISTRY
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DATE 05/09/2025 | TIME 01:30pm | LOCATION COB1 110

CHEMISTRY & BIOCHEMISTRY SEMINAR SERIES

Using Resonance Raman to probe anisotropies in CdSe nanocrystals

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Abstract:

Colloidal quantum dots (CQDs) are nanometer-sized crystalline semiconductors passivated with ligands and dispersed in a solvent. Due to their small size, they exhibit quantum confinement effects, which allow precise tuning of their absorption and emission wavelengths. Their composition and electronic properties can be engineered through various combinations of II–VI or III–V elements, depending on the intended application.

While many theoretical models assume highly idealized symmetries to describe nanocrystal behavior, real systems often deviate due to symmetry-breaking effects arising from anisotropy introduced by variations in shape and surface chemistry.

In this work, we utilize resonance Raman spectroscopy to probe the symmetry properties of excitons in CdSe semiconductor nanocrystals, with particular focus on higher-energy excitons that are difficult to access using conventional techniques. We aim to quantify the anisotropy of electronic wavefunctions contributing to Raman enhancement by systematically isolating the influence of individual symmetry-breaking mechanisms.

This research deepens our understanding of nanocrystal optical properties and provides insights for the synthesis of tailored materials for a wide range of applications.

About the Speaker:

Fernanda is a fourth-year Ph.D. candidate in Anne Kelley's Lab, working on synthesis and resonance Raman polarization on high-energy excitonic states in CdSe colloidal nanocrystals

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