Molecular Quantum Emitters

Jonathan Hood

Professor of Physical Chemistry at Purdue University

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11:00 am EST · Zoom/Birck Nanotechnology Center 1001

Link (Passcode: 954408):

Meeting ID: 936 3305 4386

https://purdue-edu.zoom.us/j/93633054386

Event Agenda: Professor Jonathan Hood is an Assistant Professor of Electrical and Computer Engineering at the Purdue University. Prof. Hood will give lecture covering his group's research in quantum emitters followed by a fireside chat with Morris Yang (Ph.D. Student at Purdue). This event is hosted by the Department of Energy's Quantum Science Center at Oak Ridge National Lab. This event will be recorded and uploaded to Youtube.

Abstract: An array of radiatively coupled emitters is an exciting new platform for generating, storing, and manipulating quantum light. However, the simultaneous positioning and tuning of multiple lifetime-limited emitters into resonance remains a significant challenge. In a recent paper, we reported the creation of superradiant and subradiant entangled states in pairs of lifetime-limited and sub-wavelength-spaced organic molecules by permanently shifting them into resonance with laser-induced tuning [1]. The molecules are embedded as defects in an organic nanocrystal. The pump light redistributes charges in the nanocrystal and dramatically increases the likelihood of resonant molecules. The frequency spectra, lifetimes, and second-order correlation agree with a simple quantum model. This scalable tuning approach with organic molecules provides a pathway for observing collective quantum phenomena in sub-wavelength arrays of quantum emitters.

Bio: Jonathan Hood is an Assistant Professor of Physics and Astronomy and Chemistry at Purdue University. His lab does experimental research in quantum optics with cryogenic organic molecules and many-body physics with ultracold laser-cooled molecules. His ultracold lab is working towards the assembly of LiCs molecules, aiming to create arrays of molecules with coherent long-range interactions in long-lived rotational states. In quantum optics, his lab uses cryogenic organic molecules to produce indistinguishable photons, with the goal of using the molecules and their interactions to create a wide variety of quantum light. Jonathan completed his Ph.D. at Caltech with Jeff Kimble and did his postdoctoral research at Harvard with Kang-Kuen Ni, before starting at Purdue in 2020. He is the recipient of the 2023 NSF Career Award.