

# Colloquium Notice

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*Nonlinear and Quantum Semiconductor  
Metasurfaces*

Metamaterials and their 2D implementation - metasurfaces - have been used extensively for wavefront manipulation since their inception nearly two decades ago. This has led to a revolution in optics due to the ability to design optical components with functionality and form factor that was unthinkable not long ago. Another use of metasurfaces relies on the ability to tailor distributions and intensities of local electromagnetic fields to study a variety of fundamental phenomena in light-matter interaction, create novel tunable and active devices and enhance optical nonlinearities.

In the context of quantum and nonlinear optics, III-V semiconductors have among the highest optical nonlinearities but cannot be used in conventional phase-matched processes due to the symmetry of their nonlinear susceptibility tensor. However, as phase matching is relaxed when resonant nanoscale resonators are used, III-V semiconductor metasurfaces can be used for harmonic generation, harmonic mixing and parametric down-conversion in ways that have no equivalence when using macroscopic nonlinear media. Some of the results that I'll present include harmonic generation and generation of entangled photons and complex quantum states using spontaneous parametric downconversion enabled by quasi bound-states in the continuum resonances. If time permits, I will also show recent results of beam steering of spontaneous emission from semiconductor metasurfaces.

Thursday

**June 8, 2023**

Starts at 12:15 PM

Coffee at 12:00 PM

Physics Conference Room, SB B326

This talk is accessible via [Zoom](#) or use

**meeting ID 829 2687 2594** and **passcode 866995** to join