Research Objective

- The study of electron, phonon, and other quasi-particle dynamics in emergent materials and state-of-the-art devices
- Investigate quantum phenomenon in semiconductor-light interactions using coherence spectroscopy for applications in quantum information

Challenges

- Identifying a combination of sample design and diagnostic techniques to extract information on relevant carrier dynamics/phenomena
- Developing robust models to connect observations with material/device properties of interest
- Working in the ultraviolet and far-infrared spectrums

Research Highlights:

- Investigation of Trap States in Mid-Wavelength Infrared Type II Superlattices using Time-Resolved Photoluminescence
- Time-Resolved Electroabsorption Measurement of Carrier Velocity in Inverted Polarity In_{1-x}Ga_{x}N/GaN Heterostructures due to Internal Electric Fields
- Theoretical and Experimental Study of Dynamics of Photoexcited Carriers in GaN
- Terahertz Studies of Carrier Localization in Spontaneously Forming Polar Lateral Heterostructures
- Pseudomorphically Grown Ultraviolet C Photopumped Lasers on Bulk AlN Substrates
- Crystal-Field Split Levels of Nd^{3+} Ions in GaN Measured by Luminescence Spectroscopy
- Unique ARL expertise in Ultraviolet, Mid- and Long-Wave IR, and time-resolved THz spectroscopy

Complementary Expertise / Facilities / Capabilities Sought in Collaboration

- Modeling of ultrafast carrier dynamics/phenomena
- Innovative materials and device designs
- UV optoelectronics (laser diodes, LEDs, detectors)
- Mid- and long-wavelength IR detectors
- Coherence effects in wide bandgap semiconductors
- Metamaterials and plasmonics
- Van der Waals heterostructures and topological insulators