Research Objective / Challenges
Quantum Networking for Secure Communication or Distributed Quantum Information
- Develop on-demand single- and entangled-photon sources
- Store quantum state: quantum memories
- Transfer quantum state: quantum repeaters & entanglement of distant solid-state qubits

Quantum Sensing
- Utilize quantum coherence and entanglement for ultrasensitive detection

Hybrid Quantum Systems
- Optically Detected Magnetic Resonance (ODMR)
- Coherent Control of Spin Qubits in 4H-SiC
- Defect Qubits in van der Waals 2D Materials

ARL Facilities and Capabilities
- Imaging and time-resolved spectroscopy
- Optical/Microwave probe and control of solid-state spin defects: Optically Detected Magnetic Resonance (OMNR), Rabi oscillations, Ramsey fringes, Spin echo.
- Quantum optical measurements: single photon counting (visible and near-infrared) and heterojunction bipolar transistor (HBT) experiments
- Ultrafast and nonlinear spectroscopy: pump-probe, wave-mixing, and harmonic generation

Complementary Expertise Sought in Collaboration
Research groups with experimental and theoretical backgrounds in solid-state and materials physics, nano- and quantum photonics and electronics, and nanofabrication