Research Objective

- To develop next-gen adaptive phase-coherent fiber laser arrays that will provide compact, light-weight, and mobile directed energy (DE) systems.
- To revolutionize battlefield tactical beam directing, communication, target designating, tracking, and maximum power delivery through atmospheric turbulence.

Challenges

- Innovative approaches for phase locking, beam combining, and maximizing the throughput of fiber laser array radiation in the far-field diffraction limited space.
- Long-range atmospheric beam propagation for different wavelengths from visible to near-mid IR regions.
- Wavefront phase aberration and scintillation intensity characteristics under deep atmospheric turbulence.

ARL Facilities and Capabilities Available to Support Collaborative Research

- The Intelligent Optics Lab (IOL) is equipped state-of-the-art instruments and test facilities to support sophisticated investigations in:
  - Adaptive, nonlinear optics, and processing algorithms,
  - Advanced real-time atmospheric imaging and image processing,
  - Laser communications for ground-to-ground and ground-to-air mobile platforms,
  - Other advanced techniques for algorithm development, simulation, imaging, and laser communication system performance.

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- New designs of high-power and high-resolution deformable mirrors for wavefront senseless beam control
- Advanced beam control technique and hardware that will operate in deep turbulence conditions.
- Investigate and develop new efficient processing algorithms for laser beam propagation in deep atmospheric turbulence.
- Advanced conformal phase-locked optical transmission modules and systems that are capable of overcome deep atmospheric turbulence.