Phase-Coherent Fiber Laser Arrays

S&T Campaign: Sciences for Lethality & Protection
Electronic Warfare

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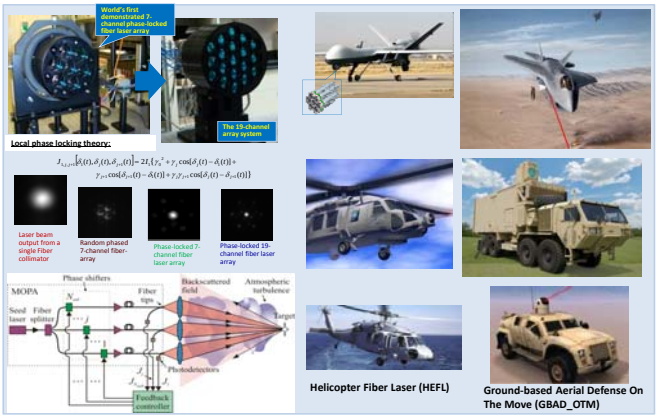
Research Objective

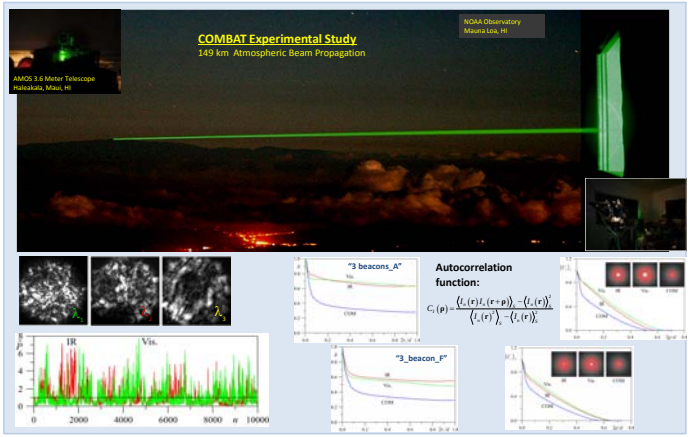
- To develop next-gen adaptive phase-coherent fiber laser arrays that will provide compact, light-weight, and mobile directed energy (DE) systems.
- To revolutionize battlefield tactical beam directing, communication, target designating, tracking, and maximum power delivery through atmospheric turbulence.



ARL has been developing compact and high-performance phase coherent fiber laser arrays for aerial and ground mobile platforms

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.

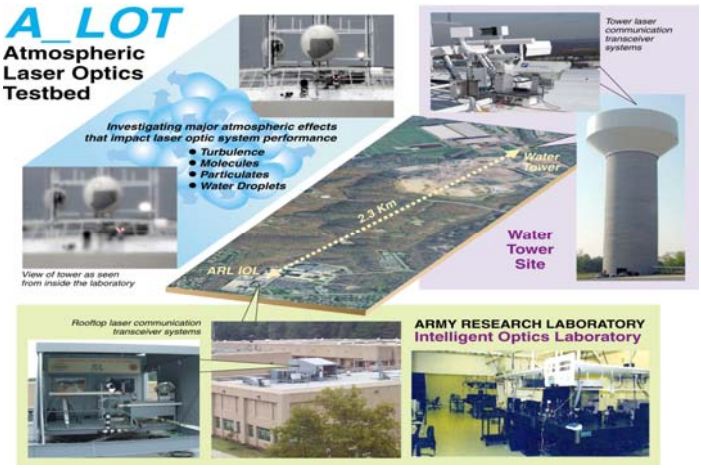


Long-range laser beam propagation experiment in deep turbulence

ARL Facilities and Capabilities Available to Support Collaborative Research

The Intelligent Optics Lab (IOL) is equipped with 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

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

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