

# **MZA Associates Corporation and Active Optical Systems**

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# **MZA Associates Corporation and Active Optical Systems**

- MZA/AOS Capabilities
- MZA/AOS Previous SBIR Experience
- MZA/AOS Future SBIR Opportunities

# MZA/AOS Capabilities

- MZA Associates Corporation
  - Multidisciplinary modeling and simulation
  - Analysis and design of advanced optical systems, especially laser weapons systems
  - Founded in 1991, ~50 employees, most with advanced degrees. Three offices, in Albuquerque, Dayton, Ohio, and Jupiter, Florida.
  - Named an SBIR “success story” for New Mexico
  - Named to the *New Mexico Technology Flying 40* for the last nine consecutive years
- Active Optical Systems (AOS)
  - Active and adaptive optical systems and components
  - A partly owned subsidiary of MZA Associates Corporation.

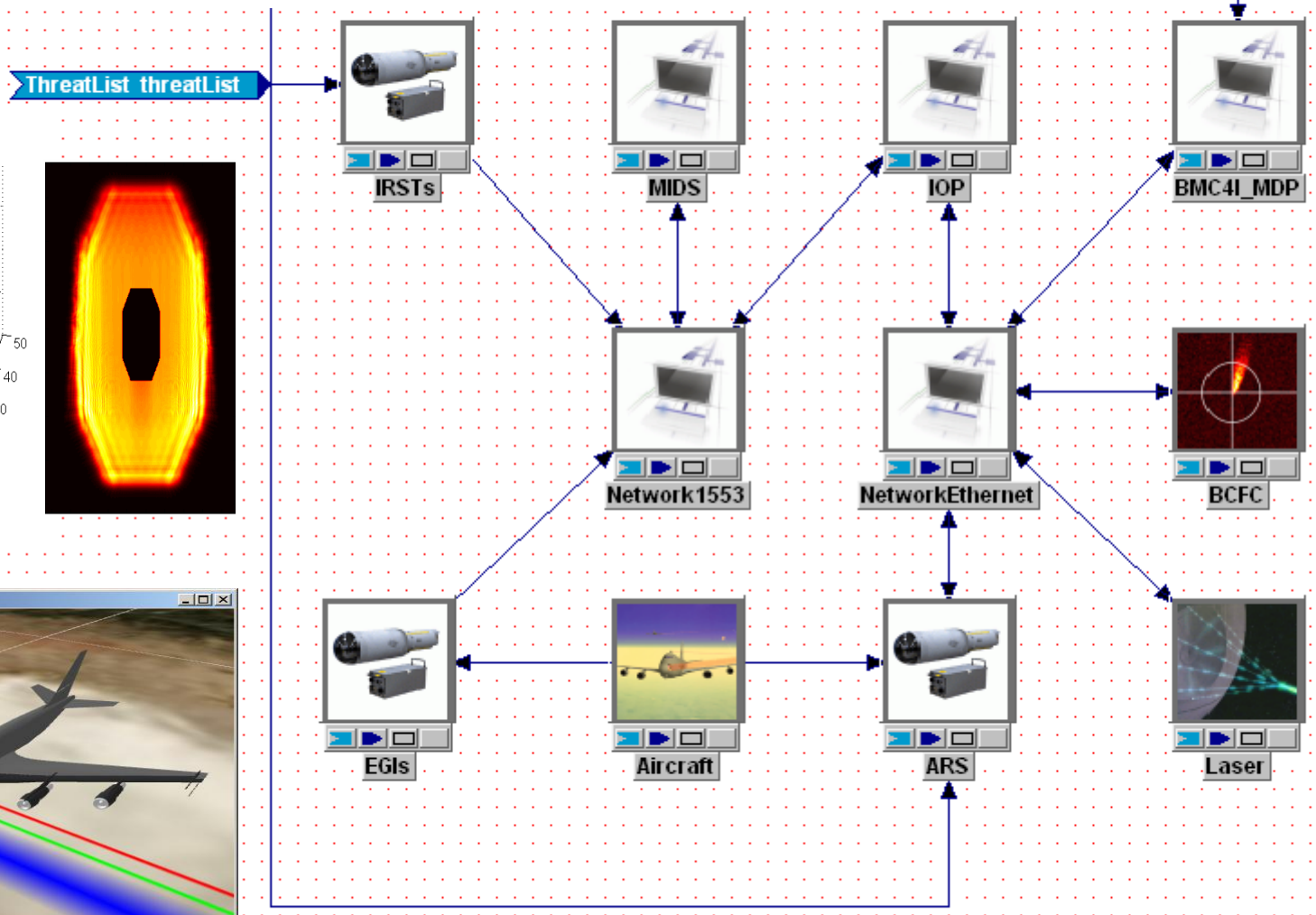
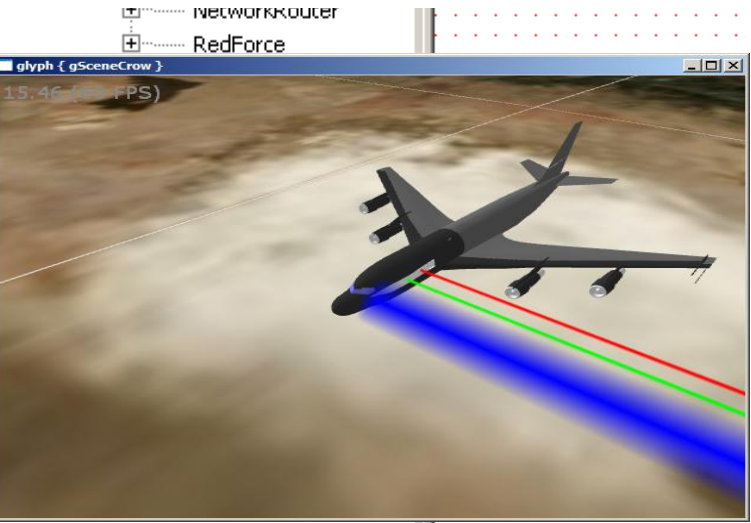
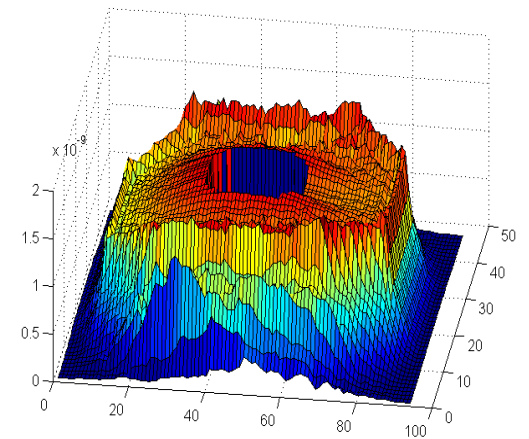
# MZA/AOS Previous SBIR Experience

- 17 Phase I SBIRs, 9 Phase II or beyond (so far)
- Our *tempus* and *WaveTrain* simulation tools have been our biggest commercial success to date:
  - \$13.3M in Phase III sales to date
  - \$760K in Phase III additional investment
  - WaveTrain has become the de facto industry standard, used in almost all laser weapons R&D.
- Other MZA/AOS SBIR technologies we believe have significant commercial potential include
  - AOS adaptive optics components and systems
  - OTHELA, a compact, lightweight, multi-purpose turret for high energy laser weapons systems
- SBIRs have been absolutely critical to MZA's continued growth and success.

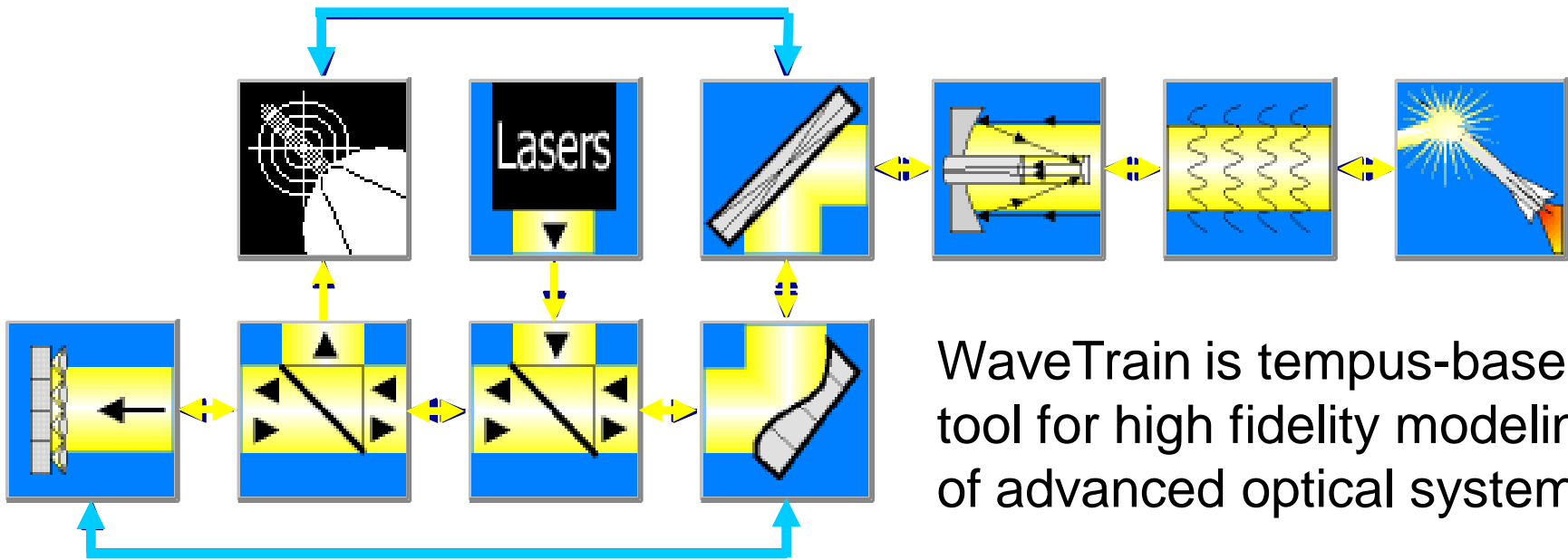
# Tempus

## multidisciplinary simulation framework

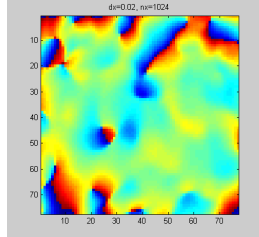
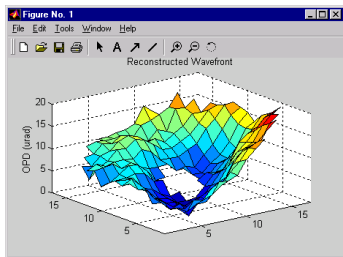
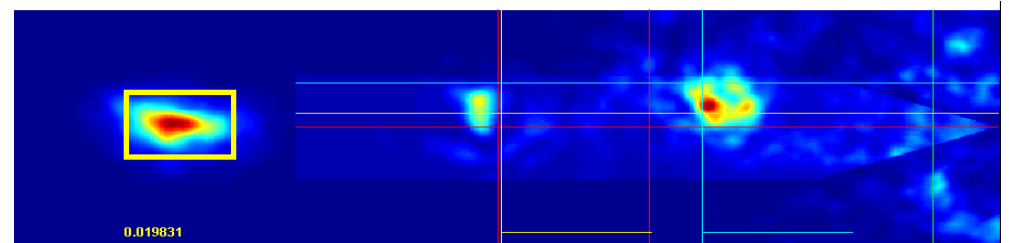
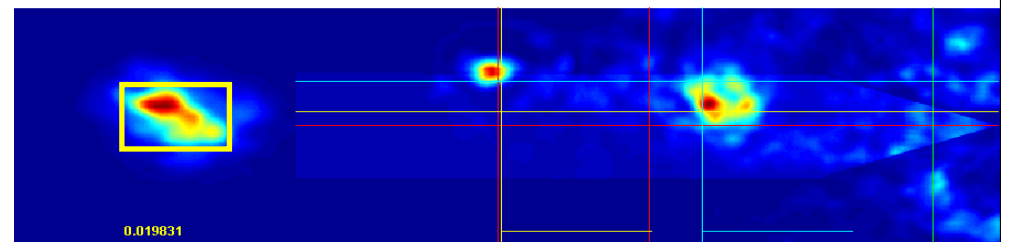
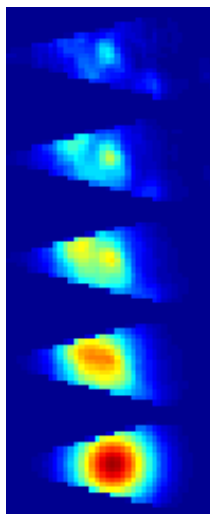
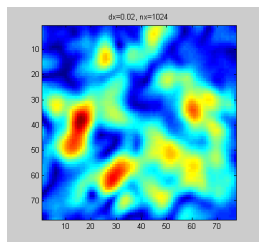
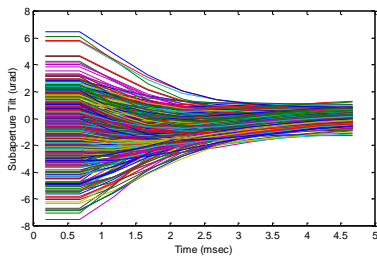
- Tempus Workspace
  - class repositories
    - ABLPAT
      - properties
      - classes
        - ABLSegment
        - Aircraft
        - ARS



# WaveTrain



WaveTrain is tempus-based tool for high fidelity modeling of advanced optical systems



# AOS Products

## Hartmann Sensors



Webcam  
HWFS

## Deformable Mirrors

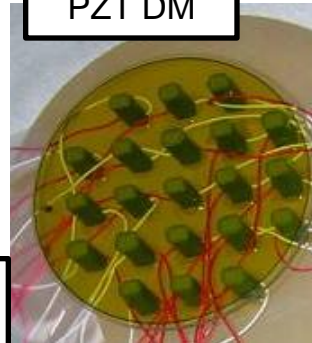


PZT DM



Firewire  
HWFS

Membrane  
DM

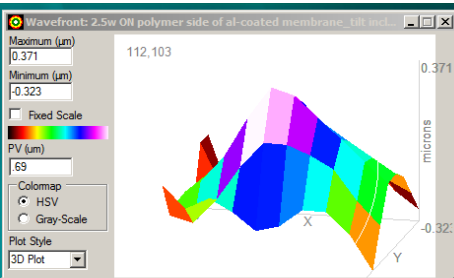


## Computer Interface Electronics

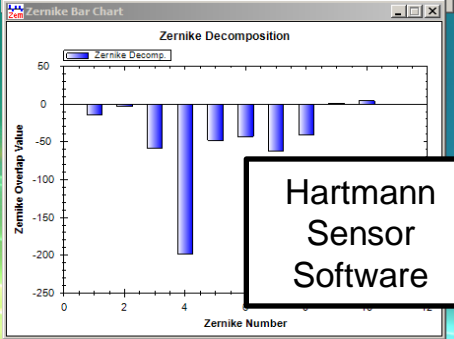
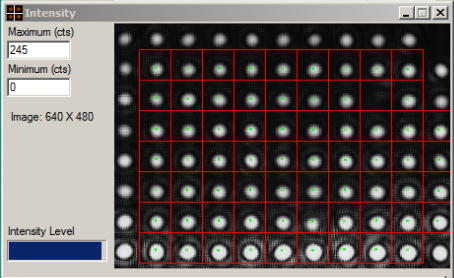


6" x 6" x 3"

USB Drive  
Electronics



## Software



Hartmann  
Sensor  
Software

Drive Electronics Controller (Active Optical Systems, LLC)

DM Control | Table | Dynamics | Configuration | Optimization | Statics

Zernike Addition  
Amplitude (counts): 222  
Zernike: 11

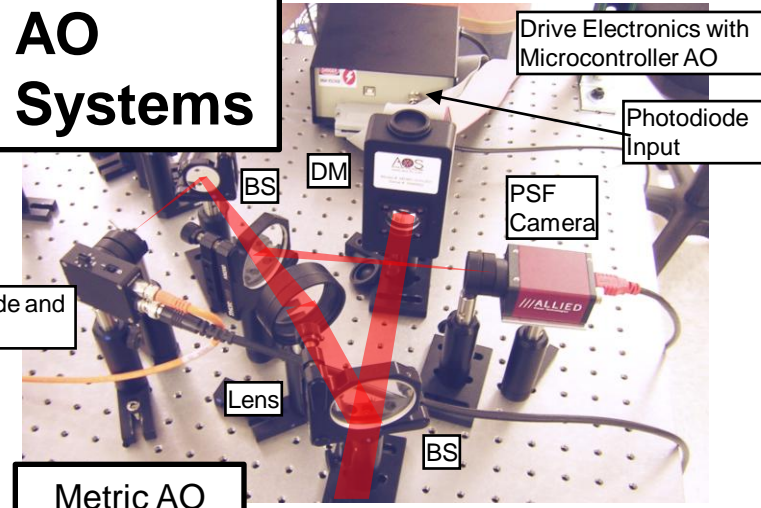
DM Type  
 Ideal PZT  
 Membrane

Membrane DM Influence Function Generation  
Resolution: 128  
Diameter (mm): 25.00  
File Base: outputIF

Photodiode and Pinhole

DM Controller

## AO Systems



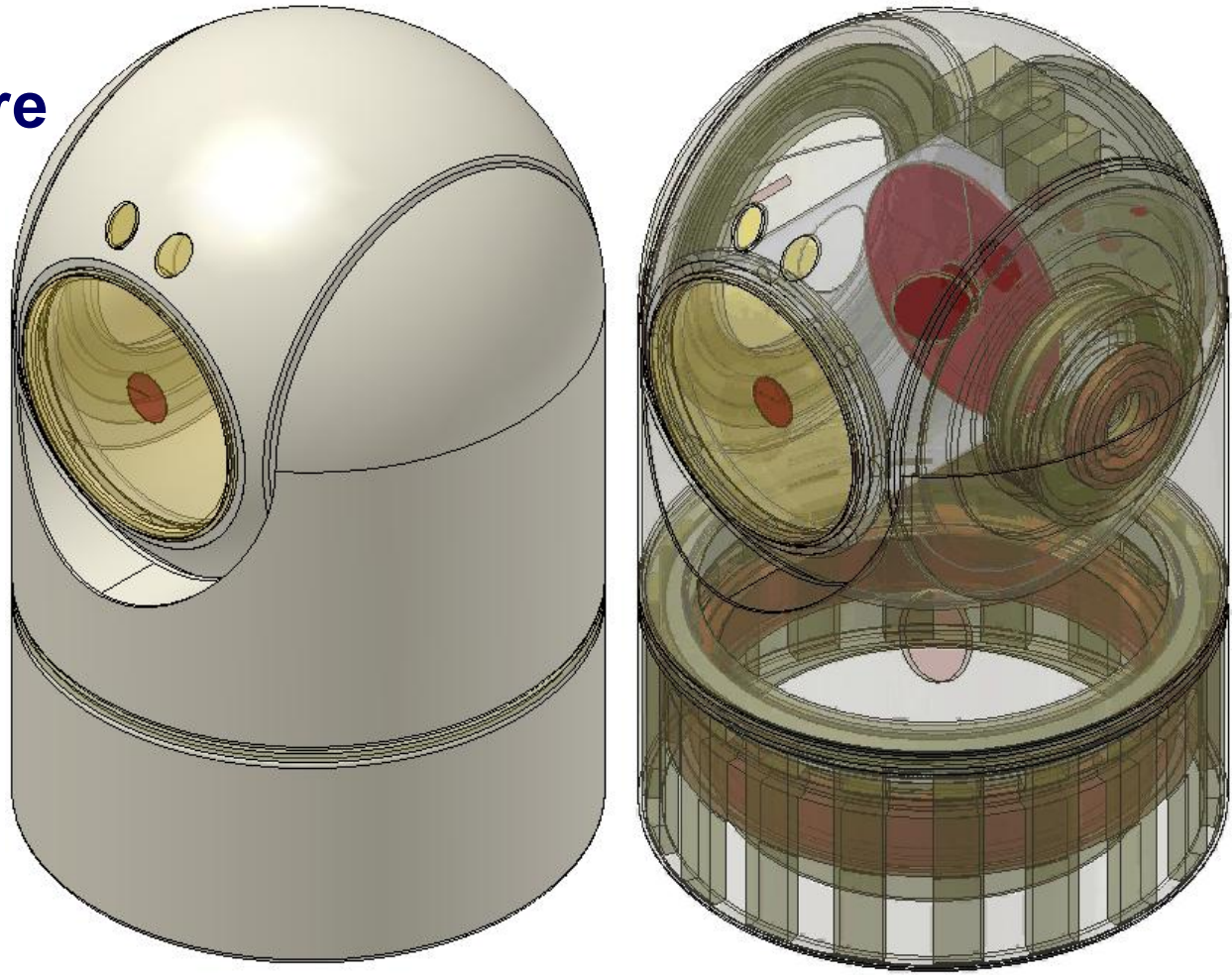
Metric AO  
System



# OTHELA

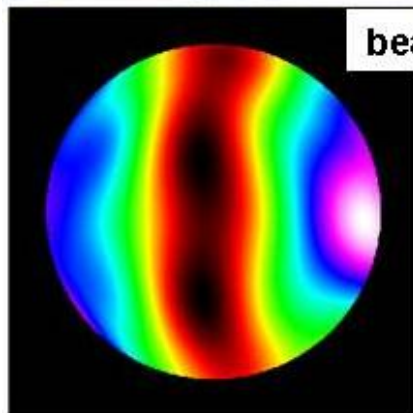
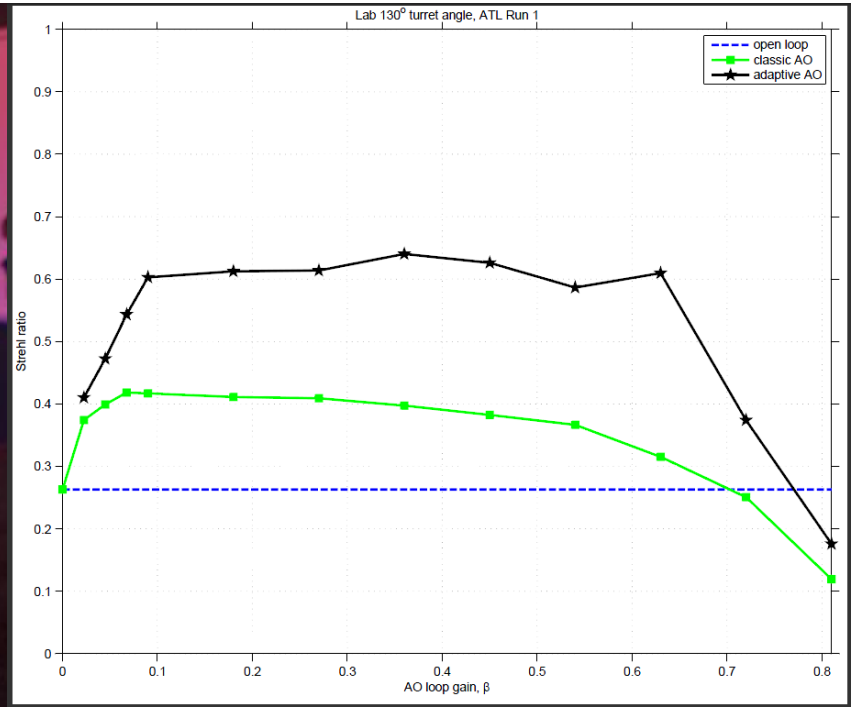
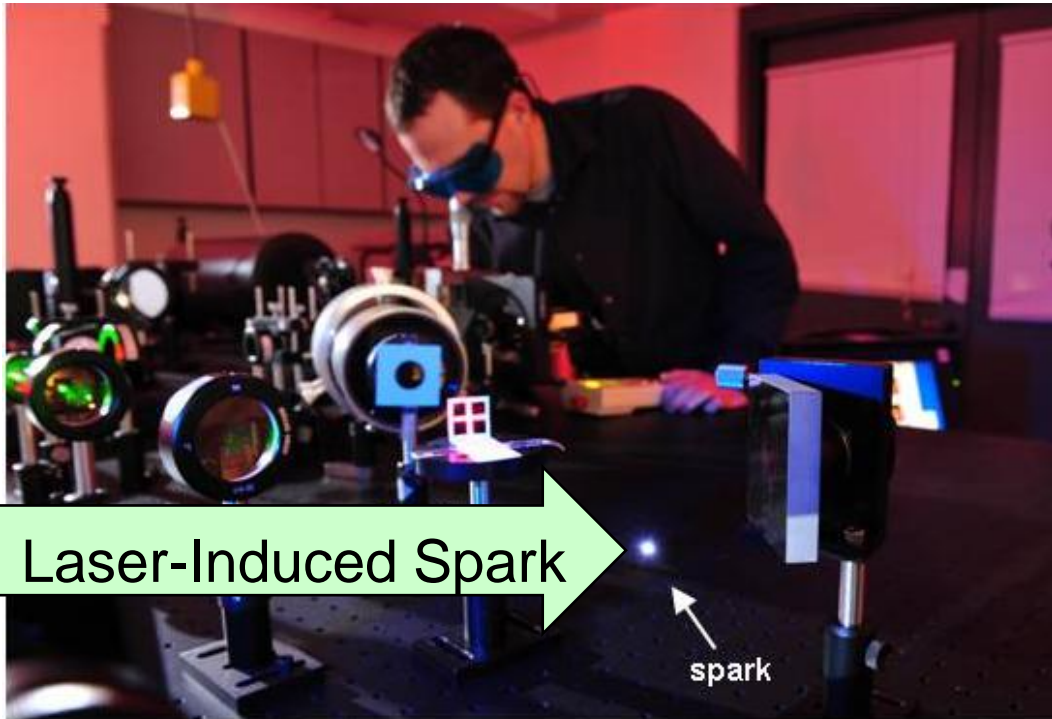
## (Optimized Tactical HEL Architecture)

The OTHELA architecture is designed minimize footprint, weight and complexity of a tactical HEL system, with optimized controls, optics and structures.

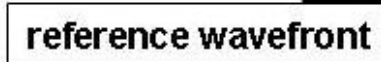




# Artificial Beacons for Aero-Optics



rms  $\Delta \sim \lambda/20$   
at 1  $\mu\text{m}$  wavelength



# MZA/AOS Future SBIR Opportunities

Possible future SBIR topics include...

- Scalable fabrication techniques for many actuator deformable mirrors
- Dynamic turbulence profiler
- Imaging through aero-optic flows
- General physical optics modeling enhancements for WaveTrain
  - Polarization, 3D beam path geometry, nonlinear interactions, etc.
- Enhancements to the tempus simulation framework
  - Surrogate-based optimization, automatic generation of surrogate models, integrated 3D modeling, etc.
- Application specific modeling requirements