



**DEFENSE**

# Refining Vision, Reinforcing Security

Adaptive Optics (AO) enhances defense capabilities by correcting atmospheric and environmental wavefront distortions in real time, delivering unmatched precision across land, sea, air and even space.

From improving targeting and surveillance systems (SSA) to enabling highly secure and fast laser communication between satellites and ground station, airborne platforms or even between naval vessels, AO ensures resilient, high-speed data transmission or crystal-clear imaging.

Whether deployed in airborne sensors, maritime systems, or space-based networks, AO is the powerful and invisible force behind sharper vision, faster decisions, and mission-critical performances.

## Secure Laser Communication

Fast compensation for atmospheric and marine-layer turbulences

High Speed  
Low budget loss  
Secured

## Directed Energy Weapons

Beam focusing and refining

Precise targeting  
Range extension  
Improved safety

## Ground Based Space Situational Awareness (SSA)

Improved resolution

Reduced atmospheric distortion  
Real-time correction and imaging  
Day and night versatility  
Large space debris tracking

**“Adaptive optics is the backbone of next-gen space defense. Studies show that even basic tip-tilt AO correction can significantly enhance uplink performance in satellite laser communication, while higher-order AO systems dramatically improve downlink quality.”**

Chueh Ting, Sr. Scientist New Mexico State Univ. (USA)

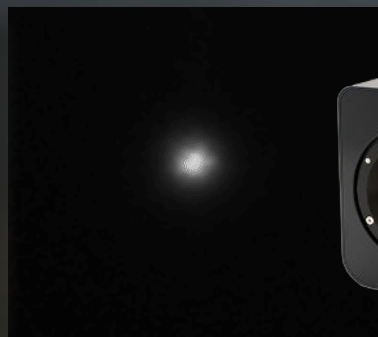
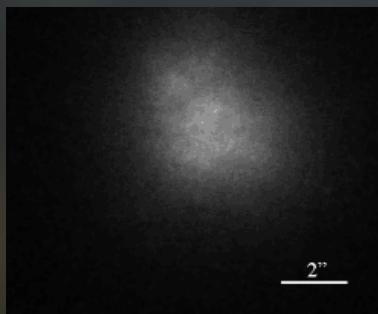


eDM 97

Credits: ONERA

**“Implementing adaptive optics can substantially increase the effective range of high energy lasers used in directed energy weapons systems.”**

Naval Postgraduate School, Monterey, CA



DM 277

Credits: Francis Bennet, Australian National University and SERC

### Bertin Alpao Defense related products

#### Deformable Mirrors

- DM 192
- DM 256
- DM 277
- DM 308

#### Shack-Hartmann Wavefront Sensors

- SH-EMCCD
- SH-EMCCD fast
- SH-InGaAs fast

#### Software Control

- ALPAO Core Engine
- ALPAO RTC



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Credits: ESO / José Francisco