

**bertin**  
alpaO



***FREE SPACE OPTICAL  
COMMUNICATION***

# Connecting Space and Earth



Free-Space Optical Communication has grown at an exponential rate over the last decades. It enables secure, high-bit communication over distances without the need for a physical connection. It can be used in a variety of different environments, notably through the atmosphere.

With Adaptive Optics, users can easily overcome atmospheric turbulence. By compensating the perturbations exhibited by the optical beams, they can guarantee reliable, secure and fast communication from end-to-end.

## Secure Cloud

- High directivity of the beam
- Line of sight required
- Hardly detectable wavelengths

## Quantum Communication

- Quantum Key Distribution compatible
- Eavesdropping proof

## Uncongested Network

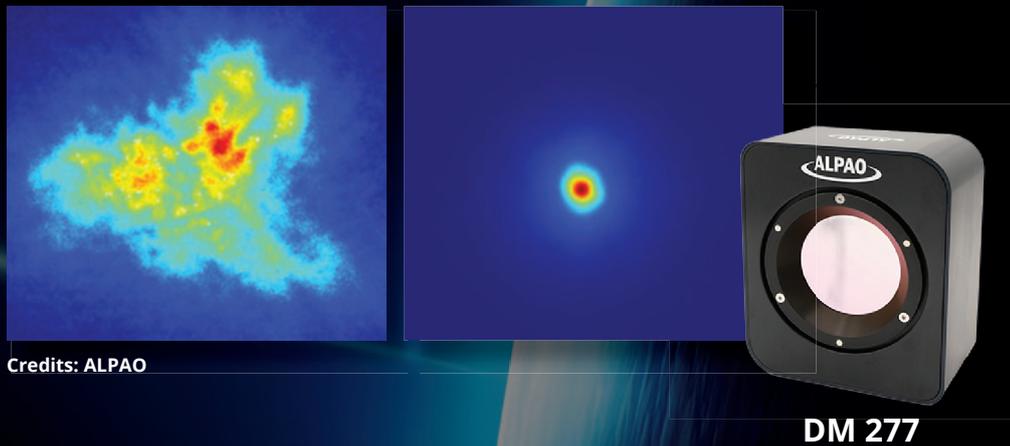
- Low probability of interference
- Uncluttered frequency space

## High Speed Connection

- Higher bandwidth
- Up to gigabit-per-second rates

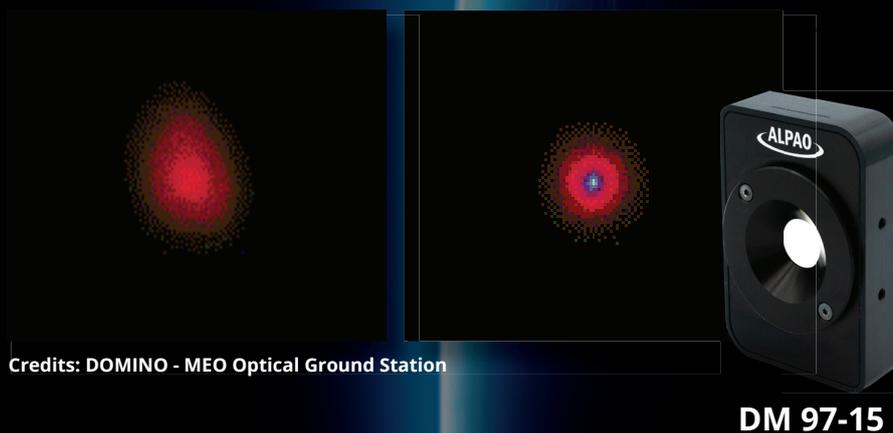
**“We estimate that for every 1% increase in light coupling, the cost of the system is reduced by 2%. In traditional AO, improving light coupling in a 40cm telescope rather than using a 60cm telescope results in savings of at least fifty thousand USD for the mount and telescope system, at least thirty thousand USD in the wavefront sensor, and at least twenty thousand USD in the dome enclosure.”**

Payam Parvizi et al. Reinforcement learning-based Wavefront Sensorless Adaptive Optics



**“An increase in transmit power or using diversity can improve the performance of the FSO system. But in order to have further improvements in SNR with a reduced transmit power requirement, AO has proven to be very beneficial.”**

Hermani Kashual et al. Optical Communication in Space: Challenges and Mitigation Techniques



### Bertin Alpao FSO related products

#### Deformable Mirrors

DM 97\*    DM 308  
 DM 192    DM 468  
 DM 277

#### Shack-Hartmann Wavefront Sensors

SH-sCMOS  
 SH-InGaAs fast  
 SH-sCMOS UV ext.

#### Software Control

ALPAO Core Engine  
 ALPAO RTC

\*Pitch options available: 0.8 mm, 1.5 mm, 2.5 mm and 5.0 mm



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