

# AO-box for Quantum communication

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## A high-performance adaptive optics module

*Cover/Top: The Q-AO-box after alignment. The customized mechanical design delivers a highly stable and compact adaptive optics module.*

The adaptive optical box (Q-AO-box) was developed in collaboration with Synopta GmbH for the Institute for Quantum Optics and Quantum Information (IQOQI), Austria to provide active fiber coupling for an 80 cm Ritchey-Chrétien telescope.

### Adaptive optics for quantum key distribution (QKD)

The compact module can be mounted directly on the telescope flange and can be adapted for telescopes with other diameters or F-numbers. It delivers the single mode fiber coupled quantum signal at its exit interface. Additional interfaces for other communication channels or the inclusion of an uplink interface is also possible.

### Broadband high performance design

- Strehl > 80 % @ 680 nm <  $\lambda$  < 1000 nm
- Transmission > 80 % between 730 nm <  $\lambda$  < 860 nm
- Polarization-independent for quantum applications

### Long-term stable housing

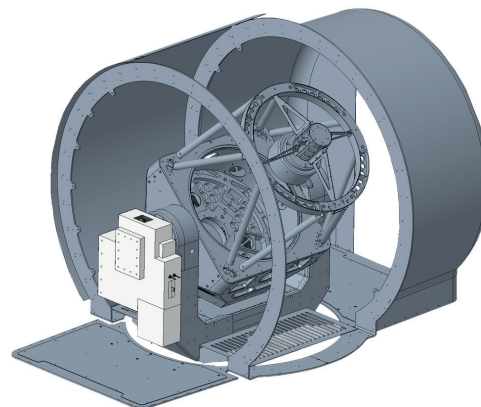
The dust-proof and temperature controlled AO-box was designed and manufactured for long term stability. The fiber-coupling module is accessible in an isolated "User-Box".

### Correction of tip-tilt and higher modes

The adaptive optics is based on a Shack-Hartman-wavefront measurement for correction with a tip-tilt mirror and a 97-actuator-DM.

### Compact system

- Robust mechanical design
- Dimensions: 800 mm x 830 mm x 250 mm
- Weight: 60 kg



*A CAD model of the Q-AO-box shows how it is positioned on the flange of an 80 cm telescope, directly in the Nasmyth focus.*

### Contact

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