

AO-box for Quantum communication

A high-performance adaptive optics module

AO-box for Quantum communication

A high-performance 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 $> 80\%$ @ $680\text{ nm} < \lambda < 1000\text{ nm}$
- Transmission $> 80\%$ between $730\text{ nm} < \lambda < 860\text{ nm}$
- Polarization-independent for quantum applications

Long-term stable housing

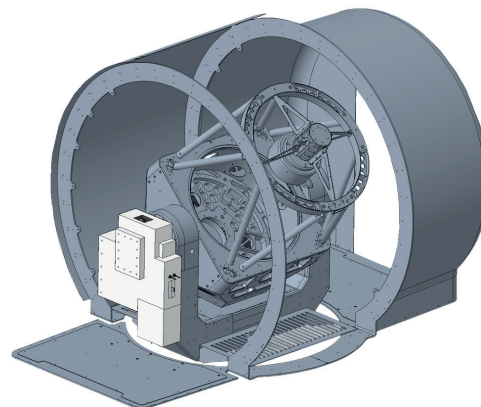
The dust-proof and temperature controlled AO-box was designed and manufactured for long term stability. The fiber-coupling module is accessible in an isolated "User-Box".

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.

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

Contact

Department
Emerging Technologies

Head of Department
Dr. Ramona Eberhardt
Phone +49 3641 807-312
ramona.eberhardt@iof.fraunhofer.de

Scientific Group
Active and Adaptive Optics
Aoife Brady
Phone +49 3641 807-339
aoife.brady@iof.fraunhofer.de

Fraunhofer IOF
Albert-Einstein-Strasse 7
07745 Jena
Germany
www.iof.fraunhofer.de



www.
more info