
Adaptive Optics system-box for the QKD transportable ground station at IAC

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Abstract

Free space optical communications implementing QKD protocols demand sensors with very high signal to noise ratio, compatible with the reduced size of a single-mode fiber core. The use of adaptive optics allows high data throughput links, by correcting the aberrations generated by atmospheric turbulence.

In this paper we present the design of an adaptive optics (AO) system-box to correct for daytime and nighttime atmospheric turbulence. The system will be small enough to be implemented at the Nasmyth focus of a transmitter/receiver 70cm-aperture telescope used as a Transportable Optical Ground Station in urban sites or LEO links scenarios or in the OGS at Teide Observatory 1 meter-aperture telescope.

The setup will correct for aberrations based on a plenoptic wavefront sensor camera. The optical performance of the system will be analysed, together with simulations of turbulence to estimate the increase on the coupling from free-space to SMF.

Keywords: : transportable optical ground station, adaptive optics, lasercoms, single mode fiber coupling, plenoptic wavefront sensing

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