
Focal Plane WFS with Machine Learning: an experimental proposal to estimate aberrations through neural networks

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Abstract

Nowadays, many Adaptive Optics solutions are able to get the expected correction from an aberrated incoming wavefront. However, the Focal Plane Wavefront Sensor (FPWFS) represents a desirable system, especially for new Extremely Large Telescope (ELT) generation, since it overcomes some still existing limits such as Non-Common Path Aberrations (NCPA) or Low Wind Effect (LWE), which are responsible for low-order aberrations and detrimental residuals unseen by classical AO configurations. This research proposes to set up an experimental test bench and carry out machine learning techniques to recognize the aberrations of an image directly taken from the focal plane and transported through optical fibers. This is an attempt to face the obstacles of wavefront sensing, in sight of new boundaries of Extreme AO applications.

Keywords: Adaptive Optics, Machine Learning, Focal Plane Wavefront Sensors, Extreme AO, Extremely Large Telescope

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