
A Test bench for future MCAO techniques validation

Valentina Viotto^{*1,2}, Davide Greggio^{1,2}, Ballone Alessandro^{1,2}, Roberto Ragazzoni^{2,3},
Jacopo Farinato^{1,2}, Carmelo Arcidiacono^{1,2}, Andrea Baruffolo¹, Maria Bergomi^{1,2}, Elena
Carolo^{1,2}, Simonetta Chinellato^{1,2}, Simone Di Filippo^{1,2}, Marco Dima^{1,2}, Demetrio
Magrin^{1,2}, Luca Marafatto^{1,2}, Kalyan Radhakrishnan Santhakumari^{1,2}, and Daniele
Vassallo^{1,2}

¹INAF - Astronomical Observatory of Padova – Italy

²ADONI - Italian AO National Laboratory – Italy

³Università degli Studi di Padova – Italy

Abstract

We present MATTO (Multi-conjugate Adaptive Techniques Test Optics), a wide field AO testbench, under development at the Astronomical Observatory of Padova. It is conceived as a wide field AO facility, aimed to serve as a test bench for the study and development of MCAO techniques, under a wide range of conditions. As the test bench is devised to be used in the future to reach proof of concept of new techniques, it is conceived to be flexible, thus it is divided into independently-configurable modules. The first is a reference source module, including a number of opto-mechanical groups producing atmosphere-perturbed reference beams. Both natural and artificial references (characterized by different light spectra and geometries) can be simulated. A telescope simulator module then combines the light coming from the references, mimicking the geometry of the beams in the lower atmosphere. The MCAO correction module is designed to simulate a wide variety of compensation schemes, thanks to the combination of three large DMs, allowing conjugation at any equivalent distance. Finally, a sensing module can simulate a wide variety of wavefront sensors, including both pupil plane and focal plane techniques, and mimic optical phase-modifiers (e.g. roof, pyramid, ...). A flexible setup allows positioning of sensing and perturbing elements in different optical positions. We here present the conceptual scheme and opto-mechanical design, together with the control approach under development.

Keywords: MCAO, testbench

^{*}Speaker