

Pupil plane wavefront sensing with 3D perturbators

mercredi 24 octobre 2018 14:30 (20 minutes)

Summary

Pupil plane wavefront sensing, in contrast with the formerly ubiquitous Shack-Hartmann where the detector is located at the focal plane position, is succeeding to conquer more and more share of the Natural Guide Stars based Astronomical Adaptive Optics systems. The extension of such an approach to reference sources that deploy in 3D (namely, largely elongated Laser Guide Stars) has been the subject of a brief burst of developments in the past (mostly around the PIGS idea) and is now being the focus of a series of concepts (revolving around the INGOT approach). It is important to describe such a devices as “conventional” pupil plane wavefront sensors with the introduction of perturbators that deploy in a 3D copy of the source images in a specific volume close to the focal plane. While it is pointed out the analogy with the layer-oriented approach we try to classify these kind of concepts in a manner that taxonomy could help to identify uncovered concepts. At the same time this can be of help, along with rules like the Scheimpflug one, to describe these device in a manner that can be useful to derive -at least at the first order, or in a comparative manner with other more conventional devices- properties like the expected sensitivity.

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Classification de Session: Wave-Front Sensing Techniques