FASS: TOWARDS A FULLY AUTOMATED MONITOR

Andrés Guesalaga*[1]

[1]Universidad Católica de Chile (PUC) – Chile

Abstract

The FASS monitor (Full Aperture Scintillation Sensor) provides estimates of profiles, together with seeing, and isoplanatic angle. The aim of the monitor is to support observations requiring the characterization of total atmospheric parameters as well as stratified information of turbulence strength in altitude. The technique uses the wavefront scintillation phenomena, and the processing is based on frequential image processing of these pattern. So far, the development of FASS has been aimed to validate the method rather than developing a fully autonomous monitor to support rutinary operations observatories.

We first present the progress in aspects of servocontrol (mount), star/pupil centring and tracking, user interface, communications, and automatic scheduling of beacon stars. For star pointing, the Alt-Az mount ensures sideral tracking accuracies better than 0.3 as and pointing accuracy lower than 10 as. Rapid variations such windshake or vibrations can be effectively eliminated thanks to the short exposure times of the camera and a fast pupil centring, providing a correct sampling of the image rings used in the technique.

Then we present a summary of the results obtained in a last campaign carried out at Paranal observatory between February 27th and March 4th, 2023.

The main difference in FASS configuration with respect to previous campaigns (1) is that the sensor was run in the generalized mode (GM), something not tested before. The GM is, in optical terms, the extended wavefront propagation below the pupil to allow scintillation to build up when generated by layers near the ground, where the standard scintillation setup is blind.

Several sensors concurred to this activity, namely:

- MASS/DIMM
- SCIDAR
- RINGSS
- SHIMM
- FASS

FASS results are compared to the other sensors and the GM performance is analysed and discussed, suggesting that this configuration can be very sensitive to the optics modelling

*Speaker

errors, star colour mismatch and noise retrieval. We believe that the impact of these factors is amplified in ill-posed problems such as the model-matching generally used in scintillation sensors.

(1) Guesalaga A., et al, (2021), FASS: a turbulence profiler based on a fast, low-noise camera, MNRAS 501, 3030.

Keywords: turbulence profilers, seeing, Cn2