
Seeing-limited integral field spectroscopy as the tool to simply estimate the outer scale parameter of the atmospheric turbulence

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Abstract

The image quality performed by ground-based large telescopes is frequently better than envisioned from DIMM-measured seeing. This improvement is one of the effects of a finite outer scale (L_0) on the wavefront of the light propagating through atmospheric turbulence. Moreover, finite L_0 also impacts the wavelength dependence of the full width at half maximum (FWHM) of point-like sources in long-exposure observations, deviating from the natural wavelength dependence of the seeing ($\lambda^{-1/5}$). Seeing-limited integral field spectroscopic (IFS) data allows checking the FWHM wavelength variation for long-exposure observations by recovering narrow-band filter images of point-like sources. These images are observed homogeneously under the same instrumental and atmospheric conditions. Deviations of such FWHM(λ) from the natural seeing provide an approach to the L_0 during the IFS observation. We present the analysis of FWHM with λ for point-like sources obtained from the Multi Unit Spectroscopic Explorer (MUSE) in the Wide Field Mode to approach the atmospheric outer scale at the Paranal observatory.

Keywords: Atmospheric effects, instrumentation: adaptive optics, site testing

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