V231b Micro-Mirror Slicer-Based IFU for High-Resolution Solar Imaging Spectroscopy

末松芳法 (国立天文台), S. R. Olivares, R. L. Lopez, M. Collados, C. Dominguez-Tagle, A. Perez-Garcia, M. Barreto (IAC)

Integral Field Spectroscopy makes feasible the simultaneous measurement of a 2D field with a use of an Integral Field Unit (IFU). Slicer-based IFUs rearrange an input 2D field to an output long-slit that is used to feed a standard spectrograph. The spatial resolution reachable with this technique is determined by the slicer width. As a technology demonstrator for a future large aperture solar telescope development, we describe an IFU for the GREGOR solar telescope. According to the optical design, the slicer unit has been fabricated: A novel technique was applied to produce a 35μm-wide metal-mirror image slicer. The IFU transforms an input rectangular field of 1.176×0.56 mm^2 into 16 mini-slits rearranged in two parallel output long-slits to feed the GREGOR infrared spectrograph for simultaneous 2D field spectropolarimetric measurements in several wavelengths. A collimator and camera mirror concept was applied to control the pupil and stray light contamination, leading to a telecentric configuration with a one-to-one magnification. An output with two full slits represents a challenge. An important issue that has been taken into account in the design is the individual mini-slit tilt, which is induced by the compact multi-mirror design. Diffraction effect in the IFU produced by the very thin slicer mirrors is not negligible. To understand the impact of the diffraction effects on the IFU and the spectrograph, an extensive study has been carried out.