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NEFER, A HIGH RESOLUTION FABRY-PÉROT SPECTROMETER

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NEFER (Nuevo Espectrómetro Fabry-Pérot de Extrema Resolución) is a 3D instrument aimed to implement high resolution spectrometry for velocity determinations of extended stellar objects.

The instrument conceived as a high resolution Fabry-Pérot (F-P) spectrometer will be hosted in OSIRIS, the tunable imager/spectrograph of the 10.4 m GTC telescope. NEFER (Figure 1) implementation does not require any hardware changes to the host instrument except substituting the tunable filter with a high resolution Fabry-Pérot (NEFER), using another set of narrow band interference filters and a calibration software package for data acquisition and reduction. The F-P will be installed within the OSIRIS collimated beam in the tunable filters wheel. It should be noted that NEFER scanning F-P and OSIRIS tunable filters have the same mechanical envelope. This configuration altogether with the OSIRIS focal reducer and the NEFER narrow band interference filters will allow us to obtain spectral information at each pixel over the whole field of view of the instrument. In this way, instead of obtaining direct narrowband images, we get a data cube interference frame by scanning the F-P at selected cavity gaps, from which we can study the kinematics of the observed region.

High level requirements for this instrument were established from the current scientific research lines and presented projects in a workshop on this observing mode (Rosado 2005). The requirements specify that it will take advantage of the unvigneted field of view of the host instrument (7×7 arcmins) and the spatial resolution determined by the detector pixel size (0.125 arcsec) and the seeing of the telescope (less than 1 arcsec). Other high level requirements specify R up to 15000 in two spectral ranges: 6300 to 7000 and 8000 to 9000 Å (galactic projects and OTELO objects kinematics) with a effective Finesse of at least 23 in the two ranges. Free spectral range of 10.95 Å (500 km s^{-1}) with spectral resolution of 0.5 Å (20 km s^{-1}) at a wavelength of 6570 Å (Bernal et al. 2010).

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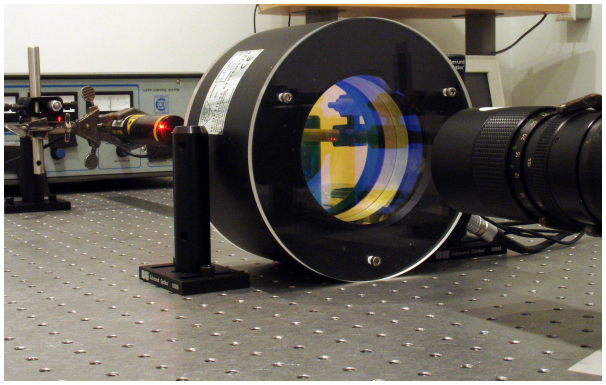

Fig. 1. NEFER scanning Fabry-Pérot interferometer characterization test at the Instituto de Astronomía laboratories.

Scanning Fabry-Pérot Observational Technique and Wavelength Calibration Reduction. To obtain accurate velocity maps of the observed stellar region is necessary a careful observational technique with wavelength calibration and data reduction analysis. The complete process would be as follow: (1) Acquisition of several images from the selected region at different scanning F-P cavity gaps to construct the data cube. (2) Acquisition of several images from a spectral lamp at the same scanning F-P cavity gaps as the data cube to construct the wavelength calibration cube. (3) Construction of the parabolic phase map. This is the base for good wavelength calibration. (4) After the data reduction process the different wavelength channels are obtained. Each channel with the same wavelength over the whole field of view and different wavelengths for each channel.

It is very important a good implementation of this wavelength calibration technique for the observational routine of NEFER.

REFERENCES

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