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OSIRIS AT GTC

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RESUMEN

En la actualidad el equipamiento del instrumento OSIRIS se encuentra prácticamente completo. El comisionado sigue su curso, pendiente de concluir las pruebas de validación de los modos de observación restantes. En esta contribución se resumirá brevemente el estado del instrumento y las tareas a abordar en el futuro próximo.

ABSTRACT

The hardware of the OSIRIS instrument is nearly complete. The instrument commissioning will continue with the validation of the remaining observing modes that are still pending. In the present contribution, the instrument status and the tasks to be tackled in the nearby future will be briefly described.

Key Words: instrumentation: spectrographs — techniques: imaging spectroscopy

1. INTRODUCTION

OSIRIS, the optical camera-spectrograph for the GTC, was installed at the Nasmyth focus of the telescope in December 2008. The commissioning of part of the observing modes, namely direct imaging, tunable imaging with the red tunable filter, and long slit spectroscopy, was carried out during January and February 2009. This commissioning was severely hampered mostly by bad weather conditions and also some technical problems, that prevent completion of all the tests scheduled. In spite of this partial commissioning, the scientific operation started in March 2009. Since then, the most relevant problem encountered was the high dark current of the detector system, due to the cryostat, that was first alleviated with contingency measures, and finally solved. Now the instrument hardware and software are nearly complete, and the commissioning of the remaining observing modes is waiting to be scheduled. In the following sections the status of the hardware, control system, commissioning, and tunable filter calibration is briefly described.

2. HARDWARE

Due to flexures, the mask magazine can load only 8 out of a total capacity of 13 masks. For solving this limitation, some new stiffer parts have been manufactured, that will be installed as soon as GRANTECAN schedules a date for the repair. Also, the multiple object mask driller (Figure 1) is currently undergoing calibration tests in factory, and its on-site delivery is expected for February 2012.

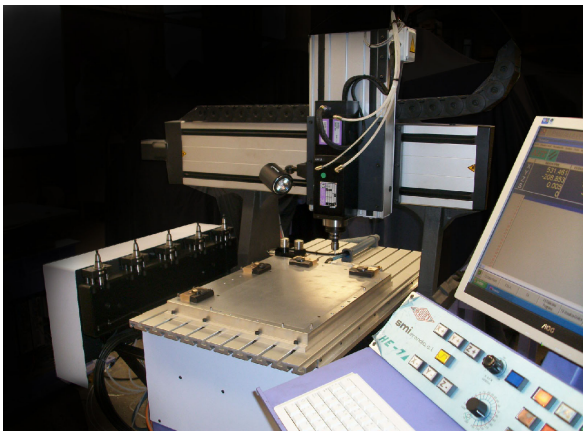

Fig. 1. The OSIRIS mask driller machine during factory calibration tests.

The blue tunable filter (BTF) has been fully characterized at the IAC premises, and the order sorters required for operation from 450nm onwards, are already available. The remaining ones, from 365 nm through 450 nm, will arrive along 2012. These, together with the mask driller machine, is the only OSIRIS hardware pending. The BTF laboratory tests show that the available full width half maxima will range between 4 and 12 Å, depending on wavelength. It is important to note that, since the detector is not UV optimized, the system efficiency is low below 400 nm.

3. CONTROL

The instrument control for all observing modes has been finished, laboratory tested, and delivered. It includes the system for compensating wavelength variations depending on instrument rotation angle

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for the red tunable filter, and temperature variation for the BTF. A final laboratory validation, for securing that the last modifications on the control system for charge shuffling on detector do not affect other readout detector modes, will be shortly done. The validation on the sky, and the possible ammendments resulting from these tests, will be tackled as soon as GRANTECAN schedules them.

The version 3.10 of the mask designer has been delivered. It allows the user designing the multiple object spectroscopy (MOS) masks for their observing programs. From an OSIRIS image or a list of coordinates, the user can place the slits and vary their length, width and orientation and, according to the priority assigned, obtaining the files to be loaded in the mask driller machine (Figure 1) for manufacturing the MOS masks required.

The version 1.2 of the pipeline has been delivered as well. It allows reducing almost all OSIRIS observing modes, including MOS. For this observing mode, the pipeline allows an automatic extraction and wavelength calibration of the 2D spectra, validated using MOS spectra already obtained using OSIRIS. The pipeline allows removing sky fringes and calibrating astrometry as well. Fast photometry and spectroscopy are the only observing modes not included in the current release of the pipeline, since no data are available for their validation.

4. COMMISSIONING

The manuals, commissioning documents and special masks for commissioning the fast photometry and spectroscopy modes has been delivered. Also, the BTF has been mounted in the OSIRIS pupil wheel and, as already mentioned above, part of the order sorters required for its operation are already available at the telescope. The first tests show a possible shift of the optical axis, to be confirmed, that will have no impact on the observations. From now on, it will be necessary calibrating the possible wavelength variation with rotator angle, the wavelength dependence versus distance to the optical axis, and finishing the remaining comissioning tests, including the charge shuffling ones.

Finally, it is expected that the commissioning of the MOS observing mode will continue from mid January 2012 on, once implemented the field acquisition routine for this mode. The commissioning of all these modes (fast modes, BTF and MOS) depend GRANTECAN schedule.

5. TF CALIBRATION

It is important to note that a deviation from the theoretical wavelength variation versus the distance to the optical axis, has been detected for the red tunable filter. The instrument team has discovered that this effect, mentioned for first time by Veilleux et al. (2010) for the tunable filter of the IMACS spectrographs of the Baade 6.5 m telescope, is due to the thickness of the reflective coatings, since they are of the same order than the etalon gap. Luckily, the functional dependence found is simple, and the total variation smaller than the theoretical one. With enough approximation, $\lambda = \lambda_0 - 5.04\ r^2$, with wavelength in Å, and distance r to the optical centre in arcminutes. This expression is valid for the whole red tunable filter wavelength range (Figure 2). A more ellaborated expression, to be used in those specific cases requiring more accuracy, will be provided in the instrument manual as well. Also, the physical details for the full general calibration will be given in González et al. (2012, in preparation).

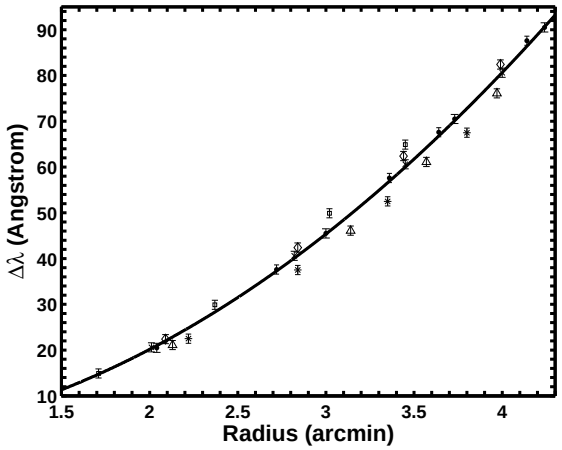

Fig. 2. Variation of the difference between the tunable filter central wavelength and the wavelength, versus distance to the optical centre, for the red tunable filter and for wavelengths ranging from 660 nm to 920 nm.

6. SUMMARY

The BTF order sorters from 365 nm through 450 nm, to be received along 2012, and the mask driller machine, to be installed in February, is the only OSIRIS hardware pending. The final versions of the instrument control system, the mask designer, and the pipeline have also been delivered. The last observing modes will be commissioned as soon as the corresponding tests are scheduled, and the implementation of the possible changes and ammendments arising from them will render a fully operative instrument.

REFERENCES

Veilleux, S., et al. 2010, AJ, 139, 145