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MANUFACTURING OF FRODOSPEC RED ARM OPTICS AND MOUNTS

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The fibrefed robotic dual-beam optical spectrograph FRODOSpec is one of the main instruments built for use at the Liverpool 2-m robotic telescope located in La Palma. INAOE was the successful tender of the contract for the manufacturing of the red arm optics and lens mounts. The project was developed jointly by INAOE, CIO and IAUNAM. We describe the project main characteristics and the obtained results.

1. DESCRIPTION

The spectrograph optical design, carried out by Sue Worswick, has 15 lenses: three doublets for the collimator and two doublets, one triplet and two singlets for the camera. All the optics are made of three optical materials: N-FK51, N-FK51A and KzFSN-4 from Schott 2000 catalogue.

The optics diameters vary from 40 to 135 mm. The thickness of the individual lenses are between 9 and 55.6 mm. The tolerances in the edge diameter go from $+0.0/-0.5$ to $+/-$ 0.1 mm. The minimum tolerance in thickness is $+/-0.05$. The radius of curvature tolerances vary from 0.009 to 0.28 mm, the irregularity's between 1 and 2 fringes and the specification in wedge is 1 arcmin. We designed two broad band multilayer coatings to cover the spectral range 550 to 950 nm with a reflectivity less than 1%.

All cells, threaded rings, retaining rings and barrels were made of stainless steel AISI 316 to match the mechanical and thermal properties of the two glasses. The collimator mount includes one barrel, three cells and eight retaining/threaded rings. The camera mount includes two barrels, two cells and 11 retaining/threaded rings. In adition, two supports per barrel were built.

2. RESULTS AND CONCLUSIONS

To verify the performance of the collimator and the camera barrels as independent units we compare the expected interferograms with the real ones. The agreement was very good as shown in Figures 1 and 2 because all the individual optical components and the mounts were within specifications. The project was concluded successfully in May 2006, proving the reliability of the working group to develop first class instruments.

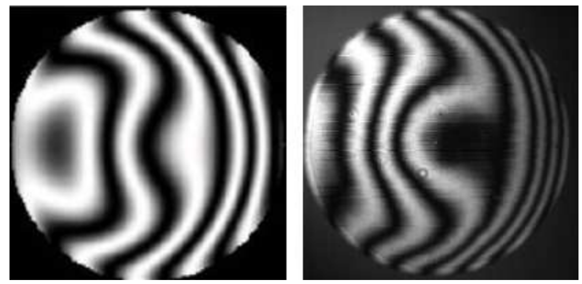

Fig. 1. Collimator interferograms: expected (left), P-V=1.1095 λ and obtained (right), P-V=1.100 λ.

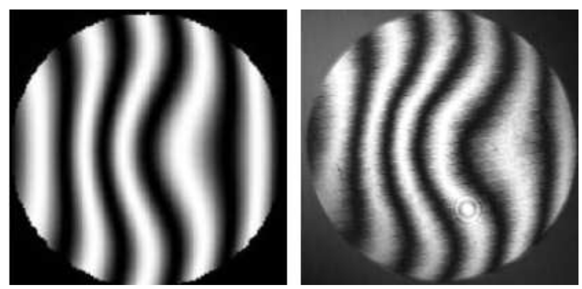

Fig. 2. Camera interferograms: expected (left), P-V= 0.539 λ and obtained (right), P-V=0.520 λ.

REFERENCES

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