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USE OF A LASER IN THE COLLIMATION OF THE CIDA SCHMIDT CAMERA

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RESUMEN

Se describe el empleo de un láser de baja potencia para el ajuste óptico del sistema Schmidt clásico. El método es sencillo y permite disminuir rápidamente la inclinación del portaplacas a 30 arcsec ≅ 0.02 mm en la orilla de la placa.

ABSTRACT

We describe the use of a low-power laser for the optical alignment of the classical Schmidt system. The method is simple and allows rapid decrease of the plateholder tilt to 30 arcsec ≅ 0.02 mm at the edge of the plate.

Key words: **INSTRUMENTS**

The optical alignment of a Schmidt telescope of classical design requires the fulfillment of three simultaneous conditions: 1) to obtain the coincidence of the optical axis of the corrector plate with the geometrical axis of the tube, 2) to locate the center of curvature of the spherical mirror at the center of the corrector plate, 3) to orient the plateholder in such a way that its surface is coincident with the system's focal surface.

It is this last condition which normally is the most time-consuming to achieve and, for this reason, Dewhirst and Yates (1954) introduced a simple method to avoid taking many focal test plates to square on the plateholder. The method uses the property that an image projected on the outer region of the corrector plate forms an image diametrically opposite to the entry point by two rays: 1) by a single reflection off the primary mirror (solid line and I_1 in Fig. 1) and 2) by triple reflection, twice by the primary and once by the focal surface if a convex reflecting plate has been placed in the plateholder (dashed line and I_3 in Fig. 1). An inclination of the plateholder from the true focal surface by θ causes a displacement of I_3 from I_1 by $x = 2f\theta$, where f is the focal length. We have applied the Dewhirst-Yates method using a low-power laser (Spectra-Physics Mod. 155, 0.5 mW) for the squaring-on of the plateholder of the CIDA Schmidt camera (1000/1520/3010 mm). The use of a laser offers two advantages over the projection of an image on the corrector plate: due to its bright beam 1) the adjustment can be carried out in the illuminated dome during the day, and 2) the multiple reflections of both ray systems are strong and permit one to point the laser precisely at the centers of the primary mirror and the plateholder. The laser was mounted on a bridge which permits its translation and rotation about an axis through the plane of the corrector plate; it is necessary that the two ray systems have the same entry point. In this way it is possible to rapidly diminish the distance x to 1 mm or less; in our case 1 mm corresponds to a plateholder inclination of 34 arcsec which means a

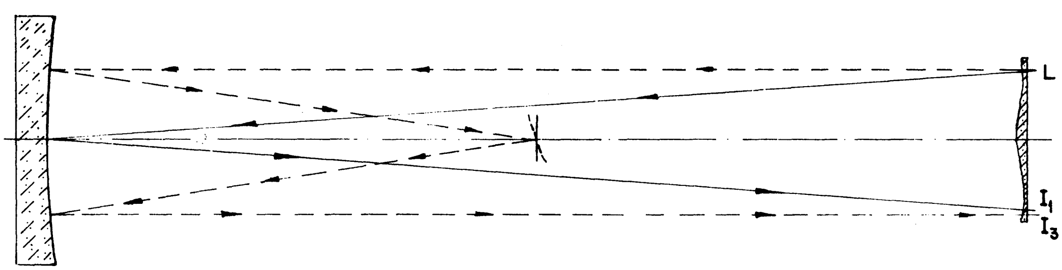

Fig. 1. Collimation of the CIDA Schmidt Camera.

negligible focus difference of 0.04 mm over the 240 mm diameter field.

REFERENCES

Dewhirst, D.W., and Yates, G.G. 1954, *Observatory* 74, 71.

DISCUSSION

Sofía: ¿Se puede aplicar esta técnica para determinar deformaciones del sistema?
MacConnell: Efectivamente, además de los resultados ya indicados, hemos realizado un pequeño estudio de las deformaciones del sistema con la posición del telescopio.
Peimbert: ¿Qué tan sensible es el foco a cambios de temperatura?
MacConnell: En el caso de la cámara Schmidt del CIDA hay barras de Invar colocadas entre el espejo y el mecanismo que soporta el portaplacas para evitar variaciones con la temperatura. Además como el cambio de temperatura durante la noche en nuestro sitio es pequeño, no hemos detectado ningún cambio de foco con la temperatura en este instrumento.

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