

REQUIREMENTS FOR INSTRUMENT ASSEMBLY

Spartan IR Camera for the SOAR Telescope

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1 Requirements

The tightest tolerances to preserve image quality are summarized in Table 1 (O Loh & E Loh, June 2001, “Mechanical Design, Spartan IR Camera”).

The entire cryo-optical box (COB) must be placed in the bathtub so that the principal ray and optical axis of the COB are parallel to $\pm 0.5\text{mrad}$ (Davis, M, & Loh, E., October 2002, “Tilt Tolerance of the ISC Mounting Plate, Spartan IR Camera”).

Table 1 Tightest tolerances for image quality. The x-direction is perpendicular to the large plates of the cryo-optical box. The z-direction is the local optical axis.

	x	y	z
Translation [mm]	0.36	0.14	0.03
Translation [mil]	14.2	5.5	1.2
Rotation [mrad]	0.1	0.2	2.7
Rotation [μm per 3in]	11	15	206
Rotation [mil per 3in]	0.4	0.6	8.1

Because the ISC is not guaranteed to be perpendicular to the principal ray, the tilt of the instrument will be adjusted during installation to make the pupil centered on the Lyot stop. At the mounting bolts, 0.5mrad translates to 0.15mm .

The optical axis of the COB and the principal ray must be translated by less than 2mm in order not to lose more than 1% on the Strehl ratio. The case run was for the detector farther from the dewar window. See Figure 1.

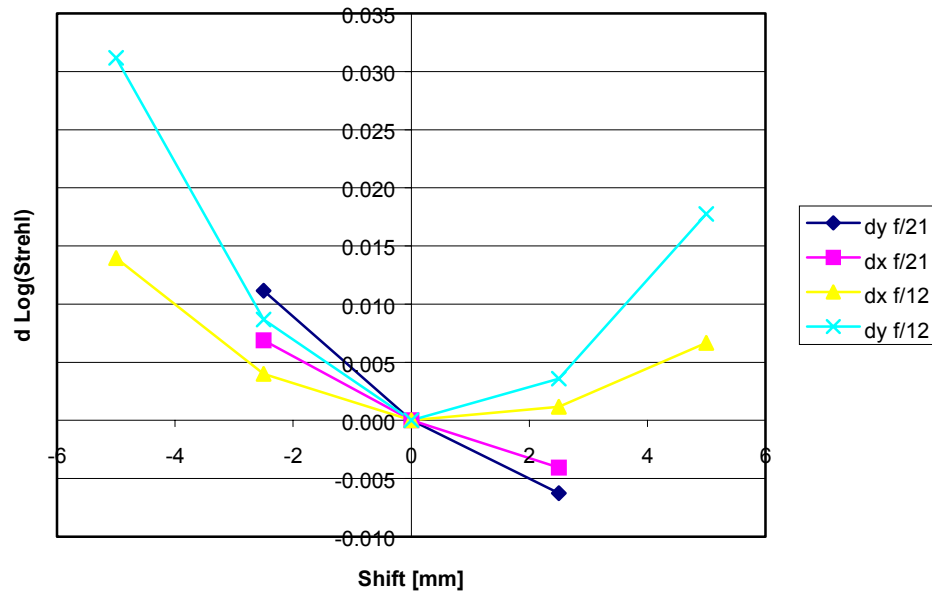


Figure 1 Change in Strehl vs shift of the instrument for one detector.

2 Alignment of Cryo-optical Box in the Bathtub

The cryo-optical box (COB) is aligned with three pins located in the top plate, bottom plate, and wall 3. These are placed to an accuracy of 0.025mm.

Intermediary plates attach the A-struts to the COB. The plates are self locating.

The A-struts attach to the bathtub, and copper wires locate the struts.