

4.7 Ghosts & Throughput of Baseline Science Path ADC

The KF9/LAFN21 atmospheric dispersion corrector for Altair is composed of two prism pairs. Incident light is partially reflected at each of the surfaces by an amount depending on the coating used for each substrate. For the analysis here Solgel was used on the fused silica substrate of the beam splitter and Magnesium fluoride (MgF_2) was used for the Air/KF9/LAFN21 interfaces. As in the IR ADC, ghosts arising from only 2 reflections were considered. Because the chosen coatings match the substrates so well, there are only 4 ghosts containing significant flux. The table and diagrams below show where the ghost light originates and what the individual fluxes are as a percentage of all the incident light on the detector.

This straight through image occurs close to the centre at (0,-0.017) and receives 99.98 % of all the light reaching the detector. Ghosts in order of intensity are:

path	percentage	First reflection	Second reflection
1	99.9807	Straight through	
2	0.0138	H...KF9-AIR	B...SILICA-AIR
3	0.0033	G...LAFN21-KF9	C...AIR-KF9
4	0.0020	B...SILICA-AIR	A...AIR-SILICA
5	0.0001	F...AIR-LAFN21	E...LAFN21-AIR

Table 4.7 – Relative percentages of the total light incident on the detector for the Altair KF9/LAFN21 ADC

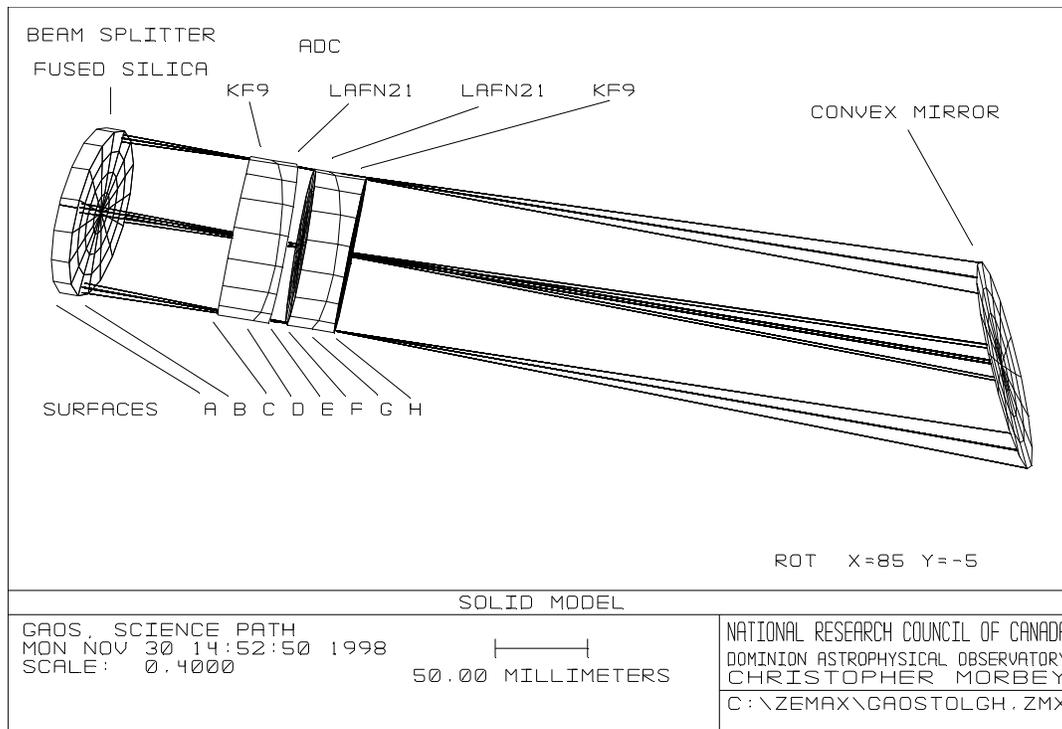


Figure 4.10 - Altair Science Path ADC(KF9/LAFN21)and Beam Splitter

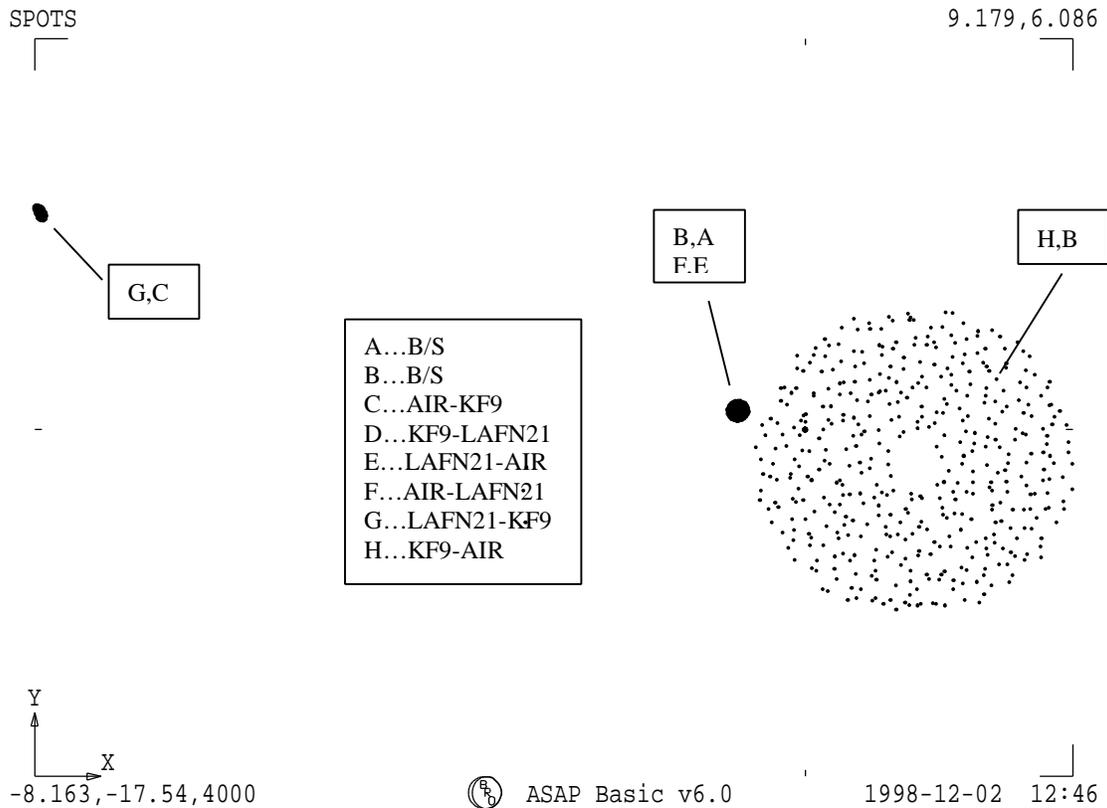


Figure 4.11 - Position of the Altair KF9/LAFN21 ADC Ghosts on the Detector

Figure 4.11 shows where the various ghosts from the KF9/LAFN21 ADC are situated on the detector. The position of the direct image close to the origin at 0,0 is overlapped somewhat by the large, and hence low surface brightness, ghost image resulting from reflections at the surfaces H and B. Ghosts at the position B,A/F,E overlap.

Figure 4.12 shows the percentage of light on the detector as a function of wavelength for the non-ghosted light. Also shown is the throughput for the whole optical system assuming perfect reflection for the mirrors. Losses due to reflection from the coated surfaces and internal absorption are included.

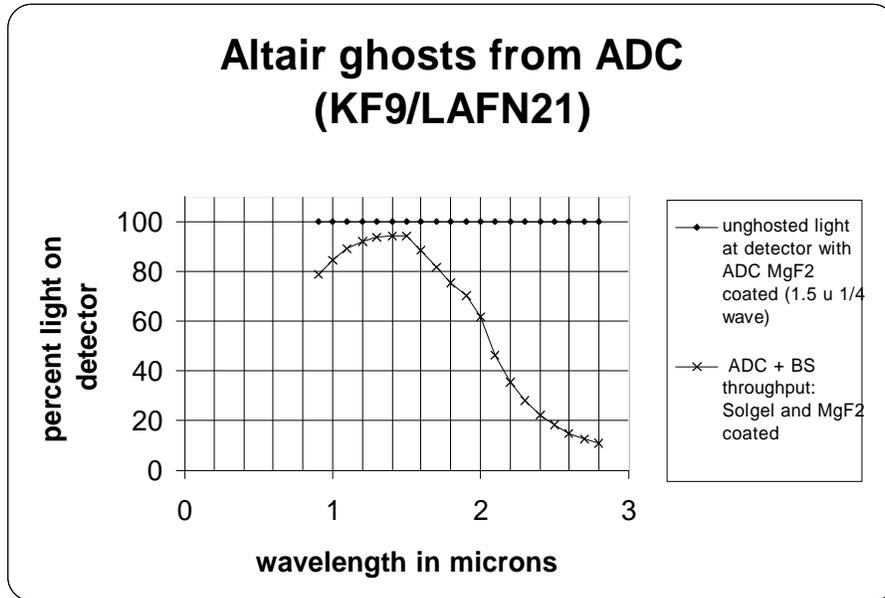


Figure 4.12 – Throughput and Non-ghosted Light for the Altair KF9/LAFN21 ADC Path

Non-ghosted light is the direct light incident on the detector that has not been reflected at a previous surface. The plot in Figure 4.12 is reproduced as Figure 4.13 at a larger scale and without the throughput component. Peak non-ghosted light occurs in the region of 1.5 μm , which is the wavelength chosen for the coating thickness of $\frac{1}{4}$ wavelength.

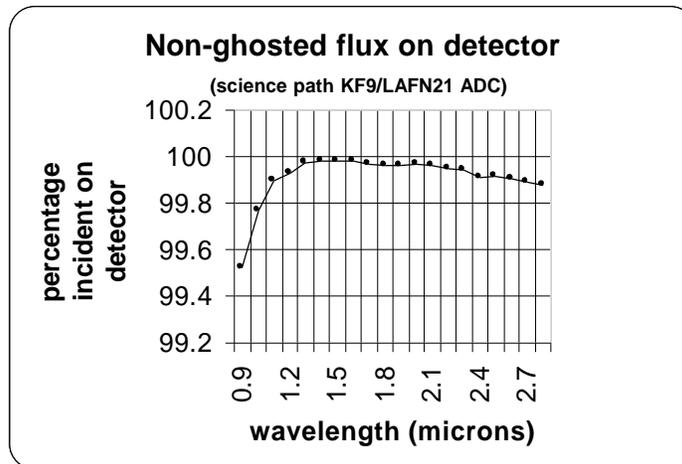


Figure 4.13 – Non-ghosted Light at the detector of the Altair KF9/LAFN21 ADC Path (Throughput of ADC)