1 Modelling of Dichroic Performance for AO WFS

There will be two dichroic mirrors used with SWIFT on the Adaptive Optics bench at Palomar. These will replace the current dichroic which has a cut-off wavelength of about 1 micron. The performance of the AO system in NGS mode is well-documented using the light from this dichroic. In order to decide what magnitude of guide star will be needed to effectively use SWIFT in NGS mode we need to compare the performance of the SWIFT dichroics with the one already in place.

To do this blackbody curves at various temperatures were used as template stars. The templates were multiplied by the AO wave-front sensor quantum efficiency curve. These QE corrected template stars were then flux-summed using the iraf task "sbands". This task sums the flux in the input spectrum in different, user-specified bands. Three bands were chosen as follows: the first included the entire spectrum from 3500 to 10000 Å, the second band had a cut-off at 7500 Åand the third had a cut-off at 6500 Å. These latter two bands correspond to the specifications of the SWIFT dichroics.

The resulting magnitude corrections are given below in Table 1. The magnitude corrections are given in reference to performance when using light from 3500 to 10000 Å, and always must be brighter. A plot of these results is shown in (reference here).

BB Temperature	Spectral Type	Dichroic	Magnitude Adjustment
3000K	M5V	750	0.693
		650	1.347
4000K	K7V	750	0.433
		650	0.871
5000K	K2V	750	0.304
		650	0.630
6500K	F5V	750	0.208
		650	0.445
7000K	F0V	750	0.189
		650	0.407
9000K	A2I	750	0.141
		650	0.312
11000K	B8I	750	0.116
		650	0.262
13000K	B7V	750	0.102
		650	0.232
14000K	B6V	750	0.097
		650	0.222
15000K	B5V	750	0.093
		650	0.213
17000K	B4V	750	0.086
		650	0.199
22000K	B2V	750	0.076
		650	0.179
25000K	B1V	750	0.073
		650	0.171
30000K	B0V	750	0.069
		650	0.162
36000K	O6	750	0.065
		650	0.156

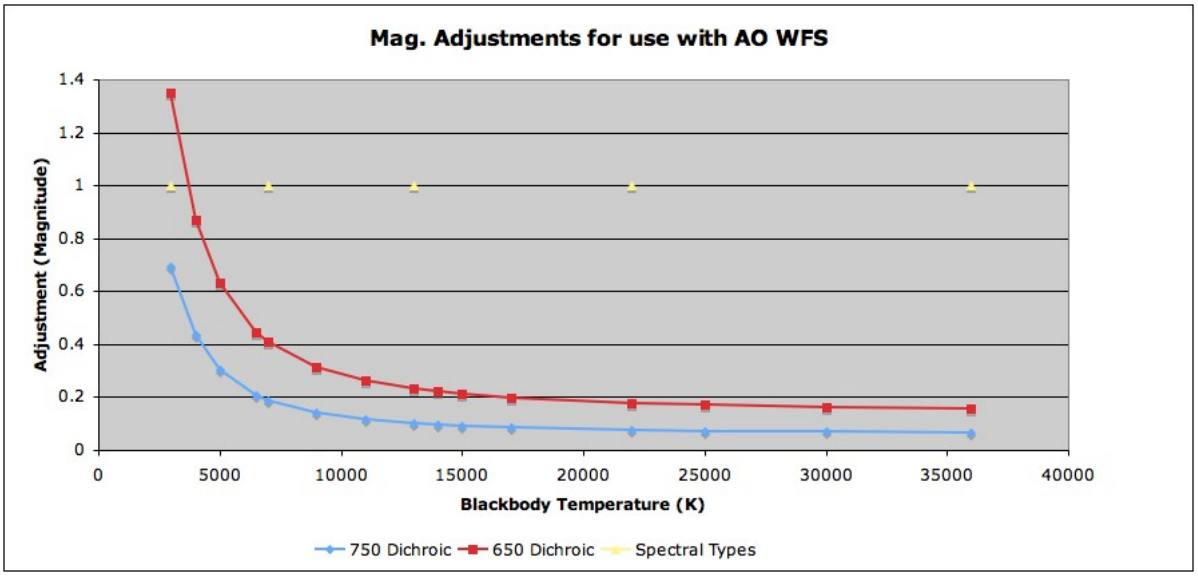

Figure 1: A plot showing the magnitude loss on the PALAO WFS with the SWIFT dichroics.