

PFIS Camera Focus Tool
24 June, 2003
khn

There are three things to focus:

1) Telescope to PFIS slit plane. This is maintained by the PFIS guider focus probe. The TCS will maintain the focus offset between the guider and the PFIS slit plane. It will hopefully need to be updated only rarely.

2) SALTICAM focus to PFIS slit plane. SALTICAM will presumably have a focus tool for its own focus. We will use it.

3) PFIS camera focus. We will need an automated camera focus maintenance and update tool, which should be efficient, since it may often be used at the beginning of an observation.

a) The camera focus tool will calculate the current nominal focus from the sum of:

1) a table of focus vs central wavelength for imaging and each grating (at 7.5°C)

2) a thermal correction to 1:

$$\Delta f(\text{imaging}) = \Delta T \times (a_0 + a_1 \times (\lambda - 600) + a_2 \times (\lambda - 600)^2)$$

$$\Delta f(\text{grating}) = \Delta T \times (b_0 + b_1 \times (\lambda - 600) + b_2 \times (\lambda - 600)^2)$$

3) delta focus correction for each filter and each polarimetric element

4) a current system focus delta, which is updated during the night:

b) The camera focus tool will provide for a focus series around the nominal focus to evaluate the system focus delta.

Inputs:

- number of exposures
- focus spacing
- exposure time

Camera focus for imaging can be done on the sky or with a comparison lamp through a focus mask. Camera focus for grating spectroscopy will be done with a comparison lamp through the planned slit or slitmask, or through a special focus slitmask.

There are two possible ways of doing this

- take individual exposures, and have the detector calculate image size (in x and y) in a specified box
- build up the image series on a single image by shuffling the CCD between exposures, then judge the focus by eye. Advantage is that all the data is on one frame. The disadvantage is that for grating focus, one would probably not be able to focus through the slit/ slitmask that would be used for the observation. This is especially a complication for multislits, where we need to align using the observing slitmask in the imaging position.

For grating focus, we will need to allow for the chromatic focus shift across the spectrum, and offset the focus of the chosen line to arrive at the best compromise focus.