Target Acquisition with Phoenix

To minimize fringing, the order sorting filters in Phoenix are wedged slightly. Consequently, the collimated beam is deflected as it passes through the filter. To ensure that the collimated beam is parallel to the optical axis after passing through the filter, light entering the spectrograph must be off-axis slightly. The required angular offset is different for each filter because of small differences in wedge angle. The wedges are oriented to deflect light primarily north-south, so that reflection ghosts will not pass through the east-west slit.

A dichroic inside Phoenix is used to separate visible light from the infrared beam headed for the filter and slit. The visible light image is used for target acquisition and guiding. Because the dichroic comes before the filter, location of a star on the guide camera TV depends only on telescope orientation and not on which filter is in use. So each filter deflects the incoming beam by a different amount, but the deflection is not registered on the guide camera. In practice this means that for each filter, targets must be placed in a different place on the guide camera TV. Otherwise, the source will not be imaged onto the slit.

There are two main techniques for locating the correct position on the guide camera TV for a given filter. One can move the viewer to slitviewer mode and take an IR image of the thermal background viewed through the slit. Next, move the slit to the open position and adjust the telescope until the source position in the IR image coincides with the previously noted slit location. Return the slit and viewer wheels to their original positions and take spectra. Alternatively, one can step the telescope north-south, until a short exposure of a [bright source](#) produces at least a faint spectrum. Refine the north-south position of the telescope to maximize counts in the spectrum.

When using slitviewer mode at the 4-m, the image scale is 0.138 arcsec per pixel. Moving the telescope east makes the source appear at larger column numbers. Moving the telescope north makes the source appear at larger line number. At the 2-m, there are approximately 1.8 times as many arcsec per pixel. Finally, the relative offsets between several of the available filters are given in the table below. These numbers may be used to reposition the target approximately, when switching between filters. Only the north-south offset is important, since east-west displacements simply move the target along the slit.

Filter Name	E--W X offset (pixels)	N--S Y offset (pixels)	E--W X offset (arcsec)	N--S Y offset (arcsec)
4132	0.0	0.0	0.0	0.0
4220	-1.9	-34.7	-0.3	-4.8
4308	-4.0	-18.5	-0.5	-2.6
4396	-8.4	-46.9	-1.1	-6.5
4484	-5.8	-33.4	-0.8	-4.6
4578	3.8	5.3	0.5	0.7
4667	5.2	2.8	0.7	0.4
4748	-2.7	-28.9	-0.4	-4.0
6420	-1.0	-9.7	-0.1	-1.3