

FREE SPACE OPTICAL COUPLING TO OCEAN OPTICS SPECTROMETER

When using free space optics the system will be susceptible to angular misalignments in horizontal and vertical beam axis as well as misalignments in the focus of the beam onto the slit. Misalignments in the horizontal axis will cause the final spectrum to be shift toward the longer or shorter wavelengths. Misalignment in the vertical axis may cause the beam to not optimally fall on the detector thereby affecting sensitivity. If the focal point is not correct then the resolution will not be optimal.

If the user plans to use free space optics then it is strongly advised that a wavelength calibration be run with the spectrometer in their set up, using the front end optics of the OEM device. This should compensate for any misalignment in the horizontal axis. The OEM optical setup needs to be focused onto the slit of the spectrometer. The FWHM of some peaks observed in a line source can help guide the focusing effort. The focus should be adjusted until the FWHM is minimized. It is possible using a free space setup to get resolutions which are higher than the calculation for the slit suggest possible. This is a result of the object being imaged not completely filling up the slit. The analog to this is using a fiber smaller than the slit giver higher resolution for the same reason.

The SMA bulkhead has an aperture which has been sized to restrict the angle of light entering the spectrometer. This has been designed to optimally fill the optical elements with out overflowing, which would increase stray light. The full angle defined by a ray from the slit to the aperture is roughly 13.5° . The full angle defined by a ray from the opening of the SMA to the slit is greater than the 13.5° . This means that in a free space optical setup that is properly focused on the slit; the SMA connector is not restricting any light.

