

TAP 701- 2: How to set up a spectrometer



Important: NEVER LIFT A SPECTROMETER BY ITS “ARMS”

A Focusing

- Adjust the eye piece so you can see the cross-hairs with a relaxed eye
- Focus the telescope on infinity (i.e. an object a long way away).

The telescope is now set to receive and focus parallel light.

- Adjust the collimator to see sharp image of slit. The collimator is now providing parallel light.
- Adjust the slit so that just enough light gets through to give an easily visible ‘line’.

B Aligning the grating

The grating must be at right angles to the parallel light from the collimator.

‘Proper’ method

(If data being taken)

- Before inserting the grating, set the telescope at 90 degrees to the collimator.
- Insert the grating so that it *reflects* light from the collimator into the telescope. It must then be at 45 degrees to the light beam.
- Turn the grating 45 degrees so that it is now at 90 degrees to the collimator. Clamp the grating turntable.
- Re-set the telescope to see an image of the slit.
- Note the telescope vernier reading (this is the zero reading from which all diffraction angles can be measured).

‘Quick’ method

(For making qualitative observations)

- Line up the telescope at 90 degrees to the collimator
- Insert the grating by eye at 90 degrees to the collimator.
- Locate a diffracted beam using the telescope.
- Slowly twist the grating and find the position when the diffracted beam has the smallest angle of diffraction. Clamp the grating table.

[The light from the collimator now 'sees' the grating slits at their full width, which gives the smallest diffraction angle: $d \sin\theta = n \lambda$, thus $\sin \theta \propto d^{-1}$, maximum 'd' gives minimum $\sin \theta$ and hence the smallest θ .]

External reference

The picture is taken from Resourceful Physics