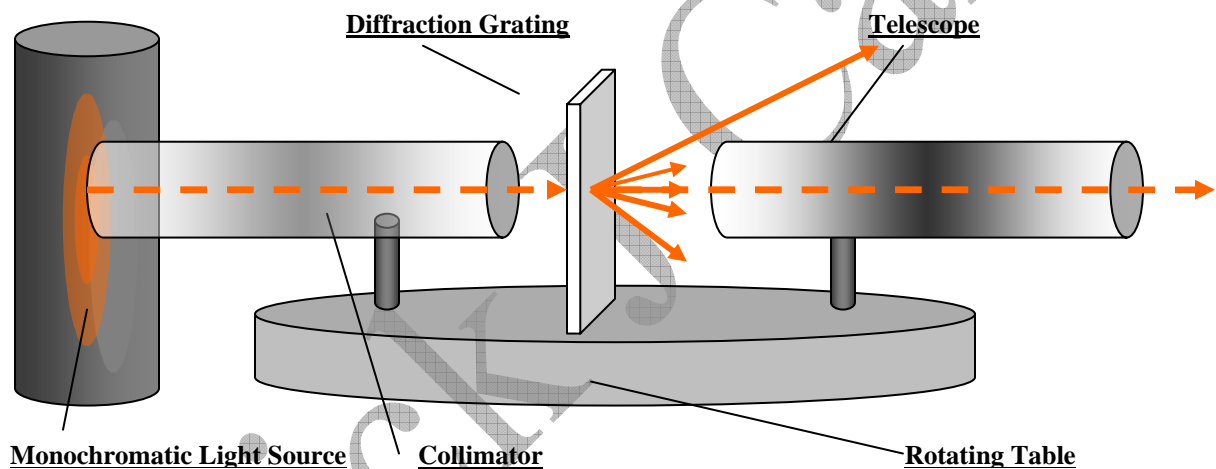


Measurement of Wavelength Using a Diffraction Grating and Spectrometer

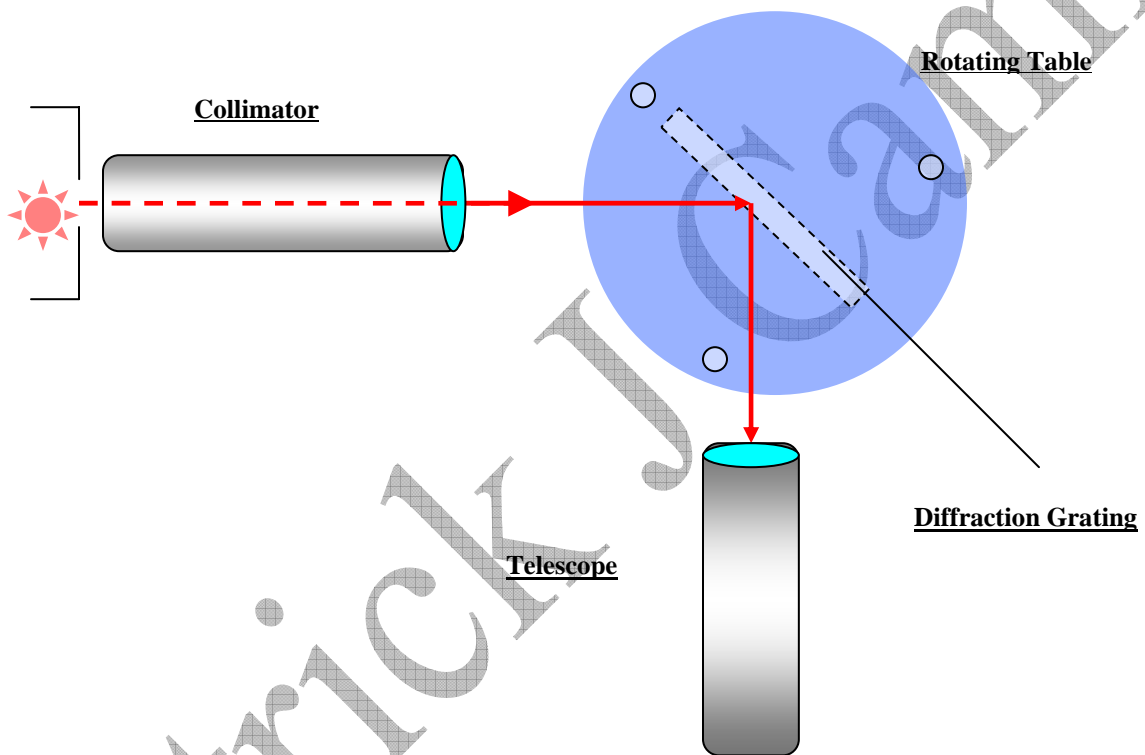
The wavelength λ of a source of line can be found by using the equation $d \sin \theta = n \lambda$ if the angular position θ of one principal maxima produced by a grating of slit known separation d (usually supplied by the manufacturer) is known. The grating is used in conjunction with a spectrometer so that θ may be measured to a very high degree of accuracy.



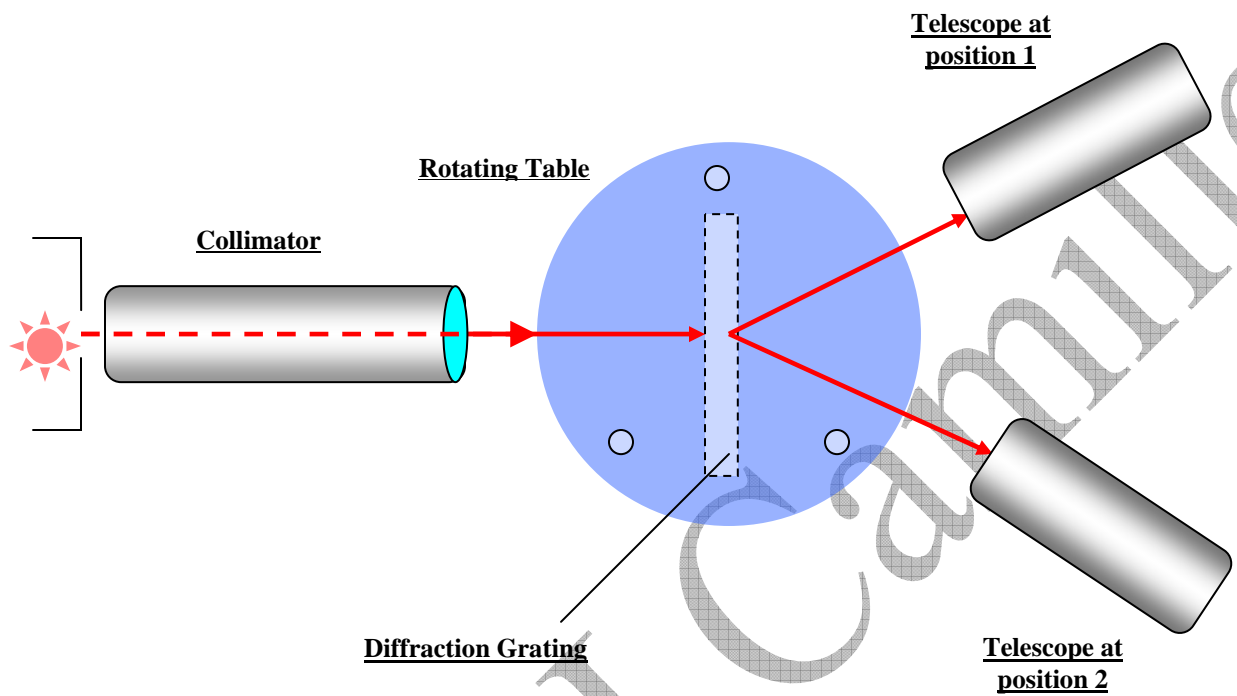
Method

- i. The telescope eyepiece is adjusted so that the cross hairs are in sharp focus.
- ii. The telescope is focused on a distant object so as to minimize parallax between the image and the crosshairs. At the same time this would ensure that the light entering the objective of the telescope is made up of parallel rays of light brought to focus on the crosshairs.
- iii. The collimator slit is illuminated by the light source whose wavelength is to be measured. It is ensured that the telescope would be in direct line with the slit by seeing that the image of the slit is in sharp focus when observed through the telescope.

- iv. The grating is then placed on the rotating table with the plane perpendicular to both the telescope and the collimator.
- v. The telescope is then rotated through 90° and then the table is turned until the grating reflects light onto the crosshairs of the telescope. This would ensure that by minor adjustments the image would be focused at the centre of the field of view. (Refer to diagram below).



- vi. The table is turned back exactly through 45° until it is again being illuminated normally by the light. The telescope is then moved circularly with the middle of the plane of the grating acting as its centre of rotation until the 1st maximum is seen on either side of the normal as shown below.



- vii. The angle Θ between the first two order principal maxima is taken. Measuring the double angle rather than Θ gives half of the error.