

### 10.3.2.1.1 Spectral apparatus

An optical arrangement or an instrument which disperses *optical radiation* into a spectrum and/or isolates a specific *spectral band* is termed *spectral apparatus* or a *spectral instrument*. If the *entrance aperture*, which may be a slit, is sharply imaged in both dimensions, i.e., length and width in the same *focal plane*, it is called a *stigmatic arrangement* or when the focal planes are different in the two dimensions, *astigmatic*. When the radiation passes through the same optical components before and after being dispersed, the spectral system is *autocollimative*.

Spectral separation or isolation of optical radiation may be achieved by using a *dispersive component* such as a *prism*, a *diffraction grating*, or a *multiple-beam interferometer*.

A *monochromator* enables a specific spectral band to be selected, e.g., by using two slits, i.e., an *entrance* and an *exit slit*. If two or more monochromators are specially constructed for simultaneous use the arrangement is termed *parallel monochromators*. A *double monochromator* results when two single monochromators are arranged in series. The exit slit of the first becomes the entrance slit of the second either physically or by optical imaging, forming a common *middle slit*. Combinations of single monochromators may be repeated giving *multiple monochromators*. If, by an optical arrangement (e.g., reflection), the beam is passed twice through the same monochromator, the apparatus is called a *double-pass monochromator*. A double monochromator, where the dispersion of the first is added to the second, is termed an *additive double monochromator* or, when the dispersions are subtracted, a *subtractive double monochromator*.

A *polychromator* results, when several spectral bands are isolated simultaneously, usually by a number of exit slits or some other arrangement.

In *non-dispersive spectral apparatus* isolation of a spectral band is achieved without wavelength dispersion by using *optical absorption*, *fluorescence*, *reflection* or *scattering*. It is also achieved by the use of an *interference filter* based on multiple beam interference. These filters are examples of *spectral filters*. A *double-beam interferometer* may also be part of a non-dispersive spectral instrument.