10.3.2.1.7 Terms relating to wavelength of radiation (see Note 1)

The *peak wavelength* λ_{max} is that wavelength at which a filter or a monochromator setting has a maximum spectral transmission.

The *mean wavelength* λ_m of a bandpass filter is the arithmetic average of the those two wavelengths at which the transmission factor is half of the maximum.

The *weighted mean wavelength* is the mean wavelength weighted by the instrument function, i.e.:

$$\lambda = \frac{\int_{\lambda_m-\delta\lambda_{0.01}}^{\lambda_m+\delta\lambda_{0.01}} \lambda_m(\lambda)\mathrm{d}\lambda}{\int_{\lambda_m-\delta\lambda_{0.01}}^{\lambda_m+\delta\lambda_{0.01}} \psi(\lambda)\mathrm{d}\lambda}$$

The *median wavelength* λ_{md} is that wavelength above and below which the instrument function contributes half the total signal:

$$\overline{\lambda} = \int_{-\infty}^{\lambda_{md}} \psi(\lambda)d\lambda = \int_{\lambda_{md}}^{\infty} \psi(\lambda)d\lambda = 1/2 \int_{-\infty}^{\infty} \psi(\lambda)d\lambda$$

The *polarization state* of radiation is, as a rule, changed with its passage through an instrument as a result of reflection, refraction, double refraction, *dichroism* and diffraction. To describe the polarizing properties, a 4 x 4 matrix (M) can be attributed to a spectral apparatus. The radiation entering the apparatus is described by a four-component vector, P_1, the *Stokes vector*. The state of polarization of the radiation leaving the apparatus can thus be given by another four-component vector P_2:

$$P_2 = (M)\ P_1$$

Lines in the spectrum not emitted by the source are *false lines*. Depending on their origin they may be either *ghost* or *scatter lines*. They may occur in grating spectra (see Note 2). Ghost lines, symmetrically grouped on both sides of strong spectral lines and caused by a

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Note 1 If wavenumber is used, different relationships apply.

Note 2 Interferometric gratings do not show ghosts.

periodical error of a long period of the ruling engine are *Rowland ghosts*. Ghost lines due to superposition of two unrelated periodical errors of different periods are *Lyman ghosts*. Misplaced spectral lines situated very near the parent line and caused by slight non-periodic variations in spacing of the grating lines are called *satellites*. If the satellites are numerous, they are called *near scatter*. Completely random variation of the groove spacing may be the cause of *far scatter*.

Spectral band selection may be obtained by moving the dispersive component (prism or grating), by moving either the entrance slit or the exit slit in the focal plane, by rotating a *refractor plate* located for instance before the exit slit, or by moving a collimating mirror.