



Figure 6.4: The half-width of the central interference line produced by a diffraction grating.

The light emitted by a sample of a substance may be split up effectively by passing it through a diffraction grating, since the direction of each interference maximum depends on wavelength. More than one complete spectrum may be formed in principle, one for each order of interference.

An interesting variation on this theme is when a relatively cool gas is illuminated by light with a broad continuous spectrum (such as the uppermost layers of a star). In this case, the gas absorbs light at characteristic wavelengths, leaving dark lines in the resulting spectrum. Again, the chemical composition of this gas is revealed by which wavelengths are absent from the original continuous spectrum.

For example in astrophysics the chemical composition of distant objects may be revealed by spectrometry.

### Dispersion and resolving power of a diffraction grating

We use a diffraction grating to measure the wavelength of a light emission by measuring the direction in which a bright line is formed. In practice, an uncertainty in the direction of the bright line will