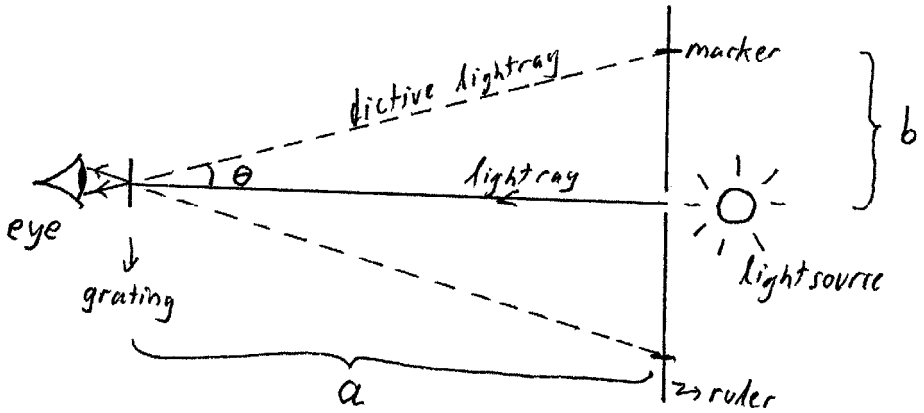
Atom spectra with diffraction grating and digital spectrometer

Aim
To investigate atomic spectres from different light sources representing different chemical elements (as gas in a glass-tube), comparing results with tables of spectral lines.

Apparatus
"Ruler-Spectrometer" and Spectroscope and DiVA Spectrometer. Light sources with power supplies. Diffraction gratings with known number of gratings per mm.

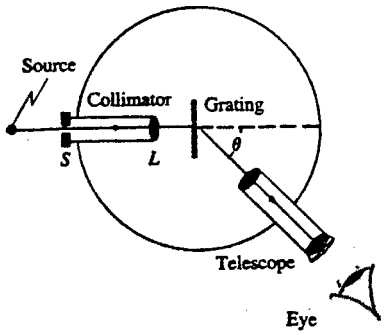
Diffraction grating
See Giancoli 6.ed. part 24-6, p.676.

The "Ruler-Spectrometer":



The spectrometer consists of a ruler having a right-angled bar in the middle. The light source to the right of the ruler sends a ray of light through the slit. This ray of light hits the diffraction of grating at the end of the bar to the left and becomes diffracted. When looking at the diffracted ray our brain interprets this as if the diffracted light comes from a specific point on the ruler (a fictive ray of light). This point corresponds to a specific wavelength (colour) belonging to a specific order of diffraction. A movable marker can mark the point. Then the distance b can be read on the ruler. For each spectral line you must read b to both sides.

The Spectroscope:



The light from the source passes a collimator. The diffracted ray is observed directly through a telescope. The angle θ is shown on the scale of the spectroscope table.

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The DiVA Spectrometer:
See seperate guide.

Data and results
For different sources of light read data, making it possible to find θ for visible spectral lines of order n = 1 or higher orders if possible.
Using the symmetry of the set-up, it is advised to get an average of each line, left and right.
Remember to note the number of gratings per mm for the applied diffraction grating.

Calculate the corresponding wavelenghts.
Compare for each element the wavelengths with a table of spectral lines.

Discuss possible random and systematic errors.