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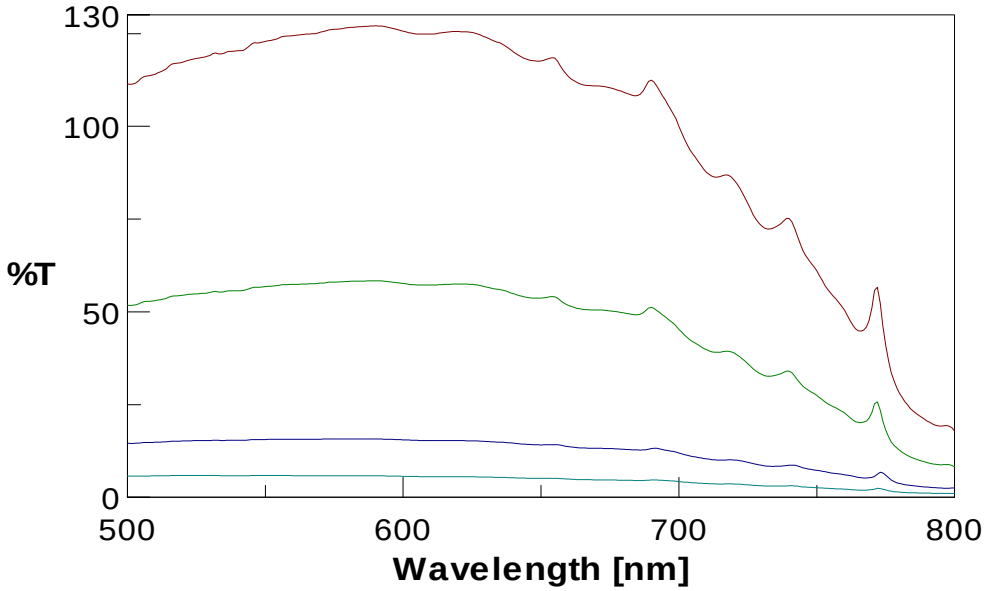
SLIT WIDTH CALIBRATION

Most of the conventional CD spectrometers are based on double prism monochromators; to operate in constant bandpass mode slitwidth must be changed over the spectral range (see T.R. 17).
When, for any reason, the slit drive needs replacement or adjustment, fine tuning of the *zero* level is necessary and it's typically a not so trivial operation.

We report here a simple method to check proper setting.
Once system has been aligned, calibration can be easily verified collecting the DC signal output (with lamp ON and nothing in the sample compartment) at constant high voltage applied on photomultiplier tube using different, narrow slitwidths.
See the following figure, in theory intensity should change with the square of the slitwidth:



SW µm	Intensity at 600 nm	Expected intensity (related to 30µm data)
30	125.6	125.6
20	57.67	55.82
10	15.50	13.95
5	5.672	3.489

Data can be considered as satisfactory:
the residual error (about 2µm) is within error coming from diffraction.

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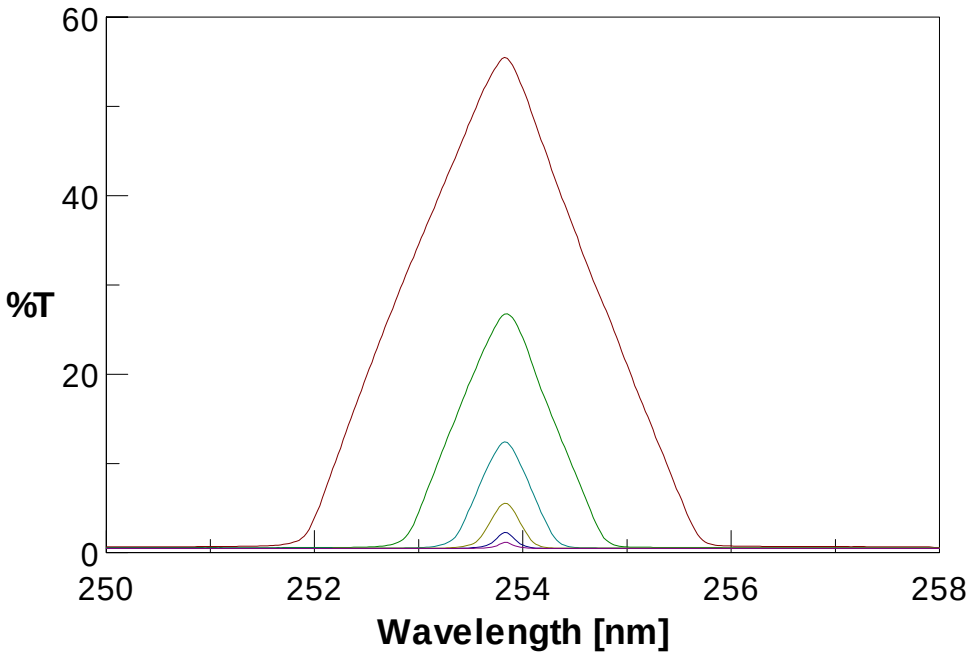
For further checks the continuous Xe lamp can be replaced with a lines source, such a low pressure Hg lamp.

We scanned here the 253.7nm line of a suitable Hg source in place of the standard.
Single beam %T mode was used (practically detecting the DC signal) using suitable HT voltage and a scanning speed of 10nm/min.



SBW	peak position*	peak height	peak area	peak width
nm	nm			nm
2	253.85	55.51	109.14	1.99
1	253.825	26.7	27.31	1.03
0.5	253.825	12.28	6.82	0.55
0.25	253.825	5.556	1.76	0.33
0.12	253.825	2.275	0.416	0.20
0.06	253.825	1.163	0.135	0.15

* wavelength scale was not calibrated …. , with fine tuning accuracy could have been improved

Several consideration are possible:
-nearly perfect wavelength reproducibility (1 data point = 0.025nm)
-peak height responds (correctly) linearly with bandpass *(in contrast with first experiment we deal here with a line, not with a continuous spectra)*
-peak area follow the square of the bandpass even better
-peak width (at ½ height) matches very well the SBW, considering that the band is not a line, and this provides information on the accuracy of the bandpass setting.

The peak width at different SBW settings can be more easily viewed autoranging the experimental data as from the next picture: at high resolution peakshape looses symmetry due to presence of adjacent 253.48nm line

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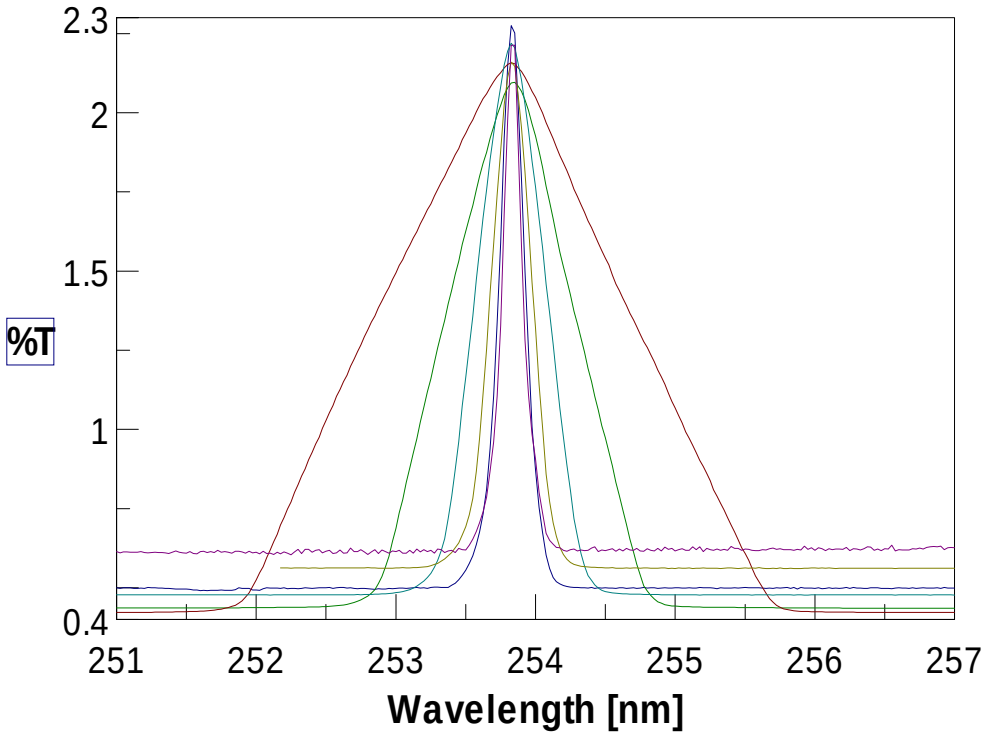

The above two simple experiments are giving full information about the quality of slit setting of your spectrometer; by second one you can also have a feeling of potential resolution in the UV range.

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