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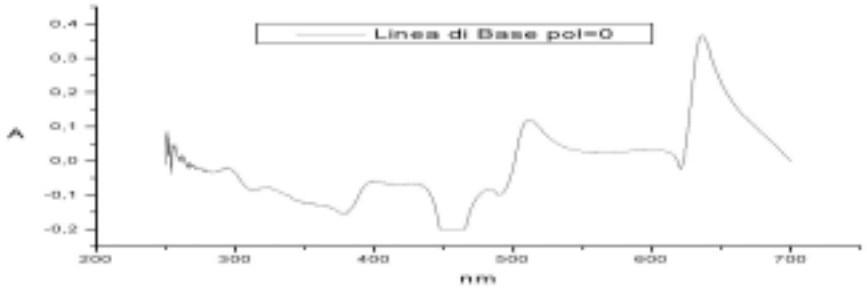
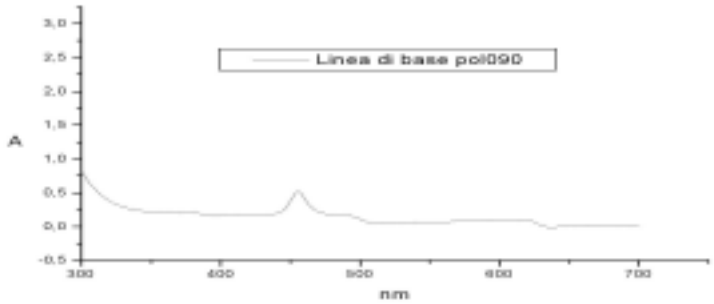
LINEAR DICHROISM (part II)

We already discussed briefly of LD in TR 16. LD has little to do with chirality, it deals with oriented system, but technique may be easily implemented in any CD spectrometer. LD is also a main source of artifacts in CD measurement, but we will talk about this complex topic another time.
$LD = A_v - A_h$ can be measured easily also on a double beam spectrophotometer, simply putting a linear polarizer before your sample. One way is to carry on two measurements with two settings of the polarizer (0 and 90°), the approach typically fails. See below two blank baselines run on an old (but not so bad) UV-VIS spectrophotometer from Jasco (model 7850), fitted with a Sterling Optics UV linear polarizer film deposed on a quartz plate.

First run:



Second run:



Why such a difference? Well for various reason, main one is that all grating monochromators polarize somehow the light, but the really big concern is that *energy* distribution outputted includes grating Woods anomalies at certain wavelengths which are highly polarized and can hardly be compensated in full.
The above case is even more critical:
-7850 has a pseudo double monochromator (wide slit concave grating monochromator followed by plane grating section with narrow slits) so artifacts are twice as normal.
-photometer is not symmetrical, it means that negative absorbance values cannot be measured below a certain level (as clearly seen in first picture where the 460nm negative band is saturated)

So the only way to get reliable measurement calls for keeping the polarizer fixed (in this case in vertical position) where artifacts are minimum and orient the sample relative to it.
Obviously using a CD spectrometer in LD mode you can keep sample in fixed orientation and this, together with sensitivity) is the main advantage of the approach.

I thank Dr Andrea Pucci of University of Pisa who reported the problem

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