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VERY FAST CD

The time barrier on conventional CD spectrometer is given by the photoelastic modulator.
When running at 50kHz you get 20μsec per data point and, since several data points are necessary, the practical limit is close to 1msec. For example on a Jasco J-810 you can collect one data point every 0.5msec.
This matches well the performance of current stopped-flow apparatus.
But, since many years, faster and much faster transient phenomena can be monitored with both absorption and fluorescence spectroscopies, so it has been a dream to extend the fast collection of CD data as well..

The group of prof. Kliger at University of California pioneered this field since 1985[1], an interesting introduction of their job is in the Berova/Nakanishi/Woody book[2] , but an even more comprehensive review was published previously[3], both articles include an ample bibliography and are a must for people potentially interested in fast CD techniques.

Basic concept behind is that different instrumental approaches are needed. In most of the special instruments prepared by this group the old approach[4] of measuring CD from ellipticity, rather than differential absorption, is followed.
Single wavelength detection or more recently spectra acquisition with spectrographs coupled to multichannel detectors can be used.
The articles above well illustrate additionally the potential artifacts from LD and LB as well as the ones which may be induced by the reaction trigger systems.

Another recent, well detailed, description of a proposed set-up is in the PhD dissertation of Edgar Zimmermann, which can be downloaded from the web: this too is a strongly recommended text, but unfortunately it's in German language…..
(http://www.theochem.uni-duisburg.de/THC/members/people/zimmermann/boddy_zimmermann.html)
Previous related experience in Duisburg was reported in 1997[5].

Current CD spectrometers are basically limited to close to millisec time resolution, faster CD hardware must be based on different approaches and will never become a simple expansion.

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