SOLEIL SYNCHROTRON

FOR **BIOLOGISTS**

DISCO
beamline

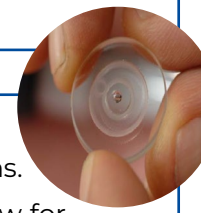
SR-CD/OCD

- ORGANISMS
- TISSUES
- CELLS
- ORGANELLES
- **COMPLEXES**
- **PROTEINS & NUCLEIC ACIDS**
- ATOMS

SAMPLES

TYPES

- Proteins, Peptides, Membrane Proteins and Amyloids in solution and thin films
- Nucleic Acids, DNA, RNA (mRNA,tRNA, siRNA)
- Organic chiral chemical compounds and Nanoparticles



CELLS

- Low volume 2-4 µl consuming CaF_2 cells of 2-50µm pathlengths.
- Standard round quartz cells allow for pathlength extension up to 1 mm reducing the spectral band.

BUFFERS

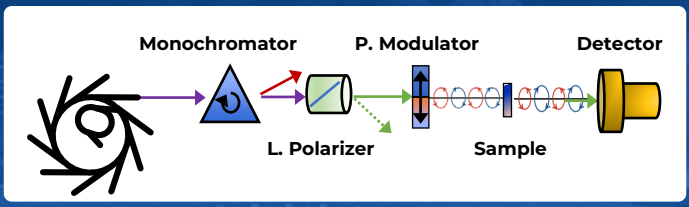
- For extending the spectral band phosphate buffers and NaF salt are preferred.
- Low chloride concentrations up to 25 mM allow the spectral extension down to 175 nm.

SAMPLES

- Amplitude strength is dependent on sample concentration and cell path length.
- Concentrations of >10mg/ml are preferable.
- α-helice rich proteins have stronger amplitudes compared to β-sheet rich proteins.
- Precious nucleic acids may be prepared on-site from lyophilised powders profiting of low volume consuming CaF2 cells.
- User provided experimental set-ups (levitation) are also supported.

TECHNIQUE

DISCO is a VUV to visible beamline dedicated to Biophysics, Chemistry and Biology. Two experimental branches for Synchrotron Radiation Circular Dichroism (SRCD) and Orientated Circular Dichroism (OCD) cover the spectral range between 120 – 320 nm for thin films and between 170 – 320 nm for soluble macromolecules. SR-CD and OCD are absorption spectroscopies probing the n-π^*, and π–π^* electronic transitions as well as exciting the charge transfer regions bellow 190nm of proteins, nucleic acids or in general chiral organic molecules.



SRCD for globular proteins in solution

Step by step SRCD/OCD spectroscopy at 1-0.1 nm resolution (3 x 3 min/spectra 170 – 320 nm) Automated thermal-scans form - 25 to 110 °C (3 - 4h)

SR-OCD for orientated samples (membrane proteins)

Automated thermal and humidity controlled sample rotation to 360° (1h)

Time-resolved SRCD for kinetics

Time lapse acquisitions of dynamic processes covering µs to hours of macromolecular kinetics

BENEFITS

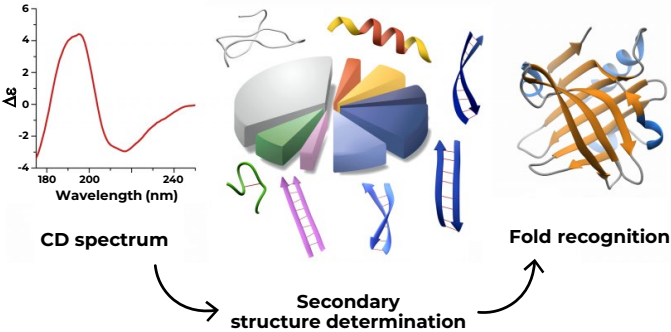
- High signal /noise ratio
- Small volumes
- More photons
- Fast data acquisitions
- Larger spectral band
- Improved information

Better Structural Analysis

HIGHLIGHTS

BeStSel

Nucleic Acids Research, Volume 50, Issue W1, 5 July 2022, W90–W98

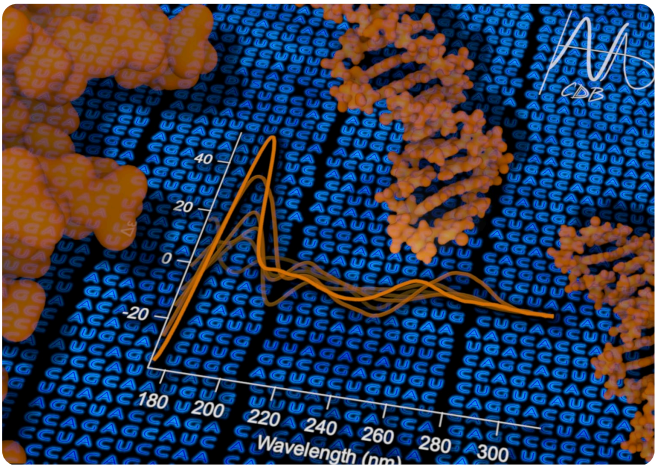


Protein Circular Dichroism Database

The PCDDB: Nucleic Acids Research, Volume 39, 1 Jan. 2011. DOI: 10.1093/nar/gkq1026

Nucleic Acid Circular Dichroism Database

The NACDDB: Nucleic Acids Res. 2023 Jan. DOI:10.1093/nar/gkac829



REFERENCES

- **RNA Spectroscopy:** Application of Synchrotron Radiation Circular Dichroism for RNA Structural Analysis. (2020) RNA Spectroscopy. Methods in Molecular Biology, vol 2113. Humana, New York, NY.
- **Bacterial Amyloids:** Amyloid Interaction with Lipidic Membrane by Orientated Circular Dichroism and Infrared Spectroscopies. (2022) Bacterial Amyloids. Methods in Molecular Biology, vol 2538. Humana, New York, NY.

More information on DISCO publications web page

COMPLEMENTARY BEAMLINES

SWING-BioSAXS:

- Predict or confirm the conformation of the macromolecule in solution
- Probe the oligomerization state under various conditions
- Probe large conformational changes induced by environmental conditions (pH, temperature, salts, cofactors,...)

PROXIMA-1 & 2A:

- Provide three dimensional models of macromolecules at atomic resolution.

SMIS:

- Secondary structure prediction, identification of beta sheets and alpha helices, including membrane proteins.

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Health & Well-Being at SOLEIL

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SOLEIL's Health and Well-being Scientific Section is composed of 30 scientific experts from different fields. Through collaborative and science-driven approaches, the Section offers the community a coherent portfolio of state-of-the-art techniques to serve scientific and societal health-related challenges.

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