

MaMaSELF

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Aspects of structure and dynamics of fiber DNA

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We study structural and dynamical behavior of DNA molecules by means of neutron scattering using the following ILL beamlines: IN3, IN5 and D22. A classical three-axis spectrometer, IN3, is employed in our experiment to obtain the information about DNA structure; IN5, the time-of-flight spectrometer, is used to measure of the longitudinal phonons in our sample and SANS instrument, D22, helps us to determine the persistence length of a DNA molecule.

IN the first part of our work we investigate the acoustic dispersion curve in A-form DNA fiber sample using inelastic neutron scattering (INS) on a TOF spectrometer, IN5. The experimental results will be compared with the longitudinal phonons branches calculated by the force-field simulations [1].

The second part of a project concerns the measurements of DNA flexibility, which are fundamental in understanding the biological role of DNA. It would be interesting to investigate persistence length as a function of temperature up to the DNA denaturation temperature. The experiment will be carried out on D22 beamline with in-situ UV absorption spectroscopy [2].

The last part involves the measurements of fiber DNA structure under the osmotic pressure. We are going to prepare two samples, and one of them will be subjected to osmotic pressure, while another will be left under normal condition. Both of the samples will be investigated by neutron diffraction with IN3 spectrometer. The aim of this experiment is to compare the structures of both samples to find out if there are any drastic changes of DNA structure under osmotic pressure.

[1] Jessica VALLE ORERO "Dynamics and thermal behavior of films of oriented DNA fibers investigated using neutron scattering and calorimetry techniques", PhD Thesis, <http://tel.archives-ouvertes.fr/tel-00734670>

[2] Peyrard Michel et al., Proposal TEST-2217, D22 beamline ILL, "SANS from short chain DNA with in-situ UV absorption spectroscopy"

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