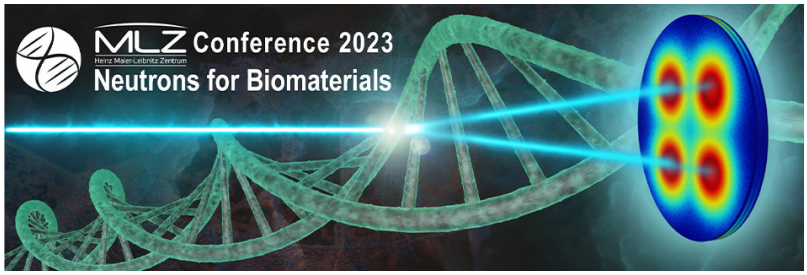

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Mapping of a Mouse Brain Slice using Neutrons

Tuesday, 23 May 2023 14:10 (20 minutes)

To elucidate the function of the brain, one needs to understand in detail the structural organization of the connectomes, i.e., the spatial architecture of the nerve fibers in the brain [1]. Various imaging techniques such as diffusion MRI, OCT, 3D PLI, etc., have been extensively used to address this issue [2-4]. Recently, X-ray have been used to study the nerve fibers in a brain slice [5]. In this case, neutrons are used to scan an entire brain section of a reeler mouse at small angle scattering geometry [6]. Interesting scattering patterns are obtained from the different parts of the section. The orientation and distribution of the nerve fibers in the brain and their degree of orientation are extracted from the scattering anisotropy. The assembly and orientation of the myelin sheaths in the brain section are estimated simultaneously from the myelin diffraction peaks. These neutron scattering results are validated with the fiber orientation map (FOM) of 3D polarized light imaging (3D-PLI). Further insights into scattering-based imaging techniques for mapping nerve fibers in a brain are discussed.

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