



Contribution ID: 142

Type: Poster

## Polarisation analysis of QENS on per-deuterated proteins.

*Tuesday, 21 March 2023 16:00 (2 hours)*

Deuterated samples are used in neutron scattering to investigate the dynamics of hydrogen atoms by contrast matching, due to the low incoherent and high coherent cross-sections of deuterium. The use of fully deuterated proteins has been restricted so far to the study of light hydration water or the collective dynamics of proteins in D<sub>2</sub>O.

In order to study kinetic isotope effects of the internal dynamics of proteins, we produced two D<sub>2</sub>O hydrated powders : a protonated Green-Fluorescent Protein and its deuterated counterpart with 99% H→D labelling. We recently performed QENS experiments combined with polarisation analysis on LET, ISIS, on the usual space range probed with proteins ( $r \in [2.5\text{\AA}^{\wedge}, 20\text{\AA}]$ ) and at the pico-second time scale corresponding to structural relaxation. Polarisation analysis enables to separate the coherent and the incoherent parts of scattering. Unexpectedly, it shatters the usual assumption that neutrons probe mainly collective dynamics in fully-deuterated proteins.

We came across the conclusion that in this space region, where the structural pattern is weakly dependent on the size or the secondary structure of the proteins, the magnitude of the coherent contribution of scattering is fairly lower than the incoherent one. It is verified at both very low (T=2K) and high (T=310K) temperatures and compared to non-polarized experiments on IN5, ILL.

**Primary authors:** NIDRICHE, Agathe (LiPhy and Institut Laue Langevin, Grenoble); Prof. KNELLER, Gerald (Université d'Orléans); PETERS, Judith (Université Grenoble Alpes)

**Co-authors:** Dr OLLIVIER, Jacques (Institut Laue Langevin); MANGIN-THRO, Lucile (Institut Laue-Langevin); STEWART, Ross (ISIS Neutron and Muon Source, UK)

**Presenter:** NIDRICHE, Agathe (LiPhy and Institut Laue Langevin, Grenoble)

**Session Classification:** Poster session TUESDAY

**Track Classification:** Health and Life Sciences