Contribution ID: **310** Type: **Talk (17 + 3 min)**

Recent advances in the development of holographic optical components for very cold and cold neutrons

Monday 20 March 2023 11:30 (20 minutes)

Milestone steps have been taken recently to meet the requirements of experimenters using cold (CN) and very cold (VCN) neutrons. In fact, despite the wide range of experiments that can benefit from the long wavelength neutrons, e.g. in the study of slow dynamics within large structures, or in the study of the neutron itself as a quantum object, their use remains limited compared to thermal neutrons. Aiming to make the realization of such experiments simpler and more accessible for a larger scientific community, we present our recent developments in the fabrication of thermally and mechanically stable optical components showing good diffraction efficiencies, and allowing for a good space management thanks to sufficiently large diffraction angles. We present the synthesis, recording process together with the light and neutron diffraction results of nanodiamond based nanoparticle-polymer composites holographic gratings [1, 2]. The diamond core has large coherent scattering and low incoherent scattering cross sections with low absorption, making it the best candidate for CN and VCN holographic optical elements. Furthermore, we highlight the impact of emerging phenomena i.e the grating decay along its thickness, the holographic scattering phenomenon and the influence of the wide VCN spectrum on the analysis of the neutron diffraction results.
[1] Tomita et al. Physical Review Applied, 14:044056, 2020
[2] Hadden et al. Proc. SPIE, 12151:1215109-1-7, 2022

Author: Mr HADDEN, Elhoucine (Institut Laue-Langevin (ILL) & University of Vienna, Faculty of Physics & Vienna Doctoral School in Physics)

Co-authors: Dr KLEPP, Jürgen (University of Vienna, Faculty of Physics); Prof. FALLY, Martin (University of Vienna, Faculty of Physics); Dr JENKE, Tobias (Institut Laue-Langevin (ILL)); Prof. TOMITA, Yasuo (Department of Engineering Science, University of Electro-Communications)

Presenter: Mr HADDEN, Elhoucine (Institut Laue-Langevin (ILL) & University of Vienna, Faculty of Physics & Vienna Doctoral School in Physics)

Session Classification: Neutron Methods

Track Classification: Neutron Instrumentation, Optics, Sample Environment, Detectors, and Software