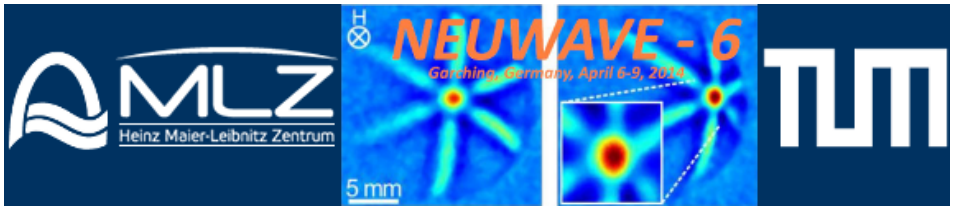

Contribution ID: **22** Type: **not specified**

Refraction based edge enhancements at structural materials –improved studies with highest special resolution and by MacStas simulations

Tuesday, 8 April 2014 14:00 (30 minutes)

Edge enhancement features can be observed for several structural materials (Fe, Al, Zr, Pb, Cu, Ti, ⋯) under certain conditions. In several dedicated experimental runs, preferential at the cold imaging beam line ICON, systematic studies were performed to understand this phenomenon from the experimental side.
On the other hand, a MacStas tool was developed for the simulation by ray-tracing of either refraction, reflection or transmission using the well-known data of material dependent refraction indices.
For the first time, a setup with 6.5 um pixel size and a 14 mm FOV was used. The neutron imaging data were obtained from a 10 um GadoX screen with cold neutrons of the white ICON spectrum. Beside some common test samples, we focused on two studies: (a) how the edge effect develops when a 20 um steel film rotates around the axis close to the beam direction, (b) what happens if objects with different refraction behavior get close together.
Most of the measurements fit to the simulations qualitatively. However, there are several open questions to be studied in detail as the relation between the attenuated and refraction beam parts quantitatively. Furthermore, the role of beam divergence and individual spectral components needs to be discussed.
Gaps between material layers and their optimized visibility and the interference of materials with refraction of opposite sign need to be studied in more detail by means of the current setup of highest spatial resolution.

Primary author: Dr LEHMANN, Eberhard (PSI)

Co-authors: Dr MORGANO, Manuel (PSI); SCHULZ, Michael

Presenter: Dr LEHMANN, Eberhard (PSI)

Session Classification: Methods + Software II