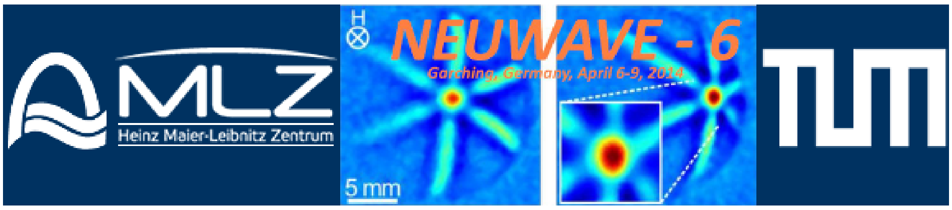

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Determination of the spatial resolution with the (magnetic) modulation transfer function

Monday, 7 April 2014 17:00 (30 minutes)

One of the most important parameters in imaging (neutron, X-ray, etc,) is the determination of spatial resolution of the used system. Various methods may yield different results sometimes, mainly due to lack of agreement in standards of measurement. A simple and direct measurement can be achieved with the "Siemens star" [1]. Another, very commonly accepted method is the determination of the modulation transfer function (MTF) of an imaging system [2]. The MTF can be directly measured, as the image contrast as a function of spatial frequency of absorbing grids having increasing numbers of line pairs/unit length. Usually such absorbing grids are not easily available for thermal or cold neutrons. Moreover, they have different disadvantages, such as finite transparency or absorption and also they have to be adapted to the system under investigation, i.e. they do not cover the frequency range continuously.
Using polarized neutrons one can produce a fringe pattern due to path length-dependent depolarization of a neutron spin by traversing a magnetic field of a coil. Changing the current in a coil one can tune, i.e. increase or decrease the number of line pairs/unit length and thus measure the "magnetic" MTF (MMTF) of the imaging system [3]. We compared the MMTF - results of coils with different shapes (circle, quadratic, triangle, rhomboid) with the MTF yielded with straight edge measurements and with those, where a constant fringe pattern was moved vertically in steps of 50µm and the corresponding change of gray values in a pixel line was measured. Further, the spatial resolution was measured for different distances of a coil (110mm, 150mm and 170mm) from the detector. Thus, one get realistic values for the expected spatial resolution of a sample, measured at these distances.

References

[1] E.H. Lehmann, G. Frei, G. Kühne, P. Boillat, Nucl. Instr.& Meth. A 576 (2007) 389–396
[2] A. Kuhls-Gilcrist, A. Jain, D.l R. Bednarek, K. R. Hoffmann, S. Rudin , Med. Phys. 37, 2, p724-735 (2010)
[3] W. Treimer, O. Ebrahimi, N. Karakas, R Köhler, W. Vollmann, Nucl. Instr. & Meth. A, in preparation)

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