50 Years of Neutron Backscattering Spectroscopy



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SPHERES: the SPectrometer for High Energy RESolution at FRM II

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SPHERES is a third-generation backscattering spectrometer with phase-transform chopper, located at a coldneutron guide of FRM II, and in routine operation since 2007. For technical details, see [1,2,3]. In this talk, for a unique assembly of experts, I will not so much celebrate what we have achieved, but rather discuss the subtle difficulties that limit the accuracy of this fine experimental method. I will also highlight recent progress in modelling beam deflection by thick mosaic crystals [4].

[1] Wuttke et al, SPHERES, Jülich's high-flux neutron backscattering spectrometer at FRM II. Rev. Sci. Instrum. 83, 075109 (2012).

[2] Wuttke & Zamponi, Simulation-guided optimization of small-angle analyzer geometry in the neutron backscattering spectrometer SPHERES. Rev. Sci. Instrum. 84, 115108 (2013).

[3] Khaneft et al, Upgrading the Neutron Backscattering Spectrometer SPHERES. II. Faster Phase-Transform Chopper with Wider Deflector Mosaic. In preparation.

[4] Wuttke: Multiple Bragg reflection by a thick mosaic crystal. Acta Cryst. A 70, 429-440 (2014).

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