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MIEZE - Neutron spin-echo optimized for magnetic materials

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Highest resolution in classic TAS and TOF techniques always comes at the price of decreased flux. This challenge has been tackled by the development of neutron spin-echo, where the resolution is completely decoupled from the wavelength spread of the instrument. Conventional neutron spin echo reaches an energy resolution down to < 1 neV. However, classical NSE is limited in the range of high energy transfers and depolarizing samples/sample environments.

MIEZE on the other hand is in essence a high-resolution, spin-echo, time-of-flight technique. In contrast to classical neutron spin-echo, all beam preparation and therefore all spin manipulation is done BEFORE the sample, opening up the possibility of introducing depolarizing conditions at the sample position.Therefore, magnetic, or strongly incoherently scattering samples can easily be measured without loss of signal. Additionally, large magnetic fields can be applied to the sample, making MIEZE an excellent tool for studying quasi-elastic and inelastic processes in quantum matter, such as fluctuations at quantum phase transitions, magnon dynamics in ferromagnets, or the melting of superconducting vortex lattices.
With the introduction of the field-subtraction coils, it has been possible to push the technique to shorter spin-echo times and higher energy transfers making it even more attractive for spectroscopic studies of quasi-elastic and inelastic processes.
As a very young technique MIEZE is still not well known in the TAS/TOF community and the I2NS meeting is the ideal place to discuss future developments and collaboration in this area.

Primary author: JOCHUM, Johanna

Co-authors: Dr FRANZ, Christian (JülichCentre for Neutron Science JCNS-MLZ, Forschungszentrum Jülich GmbH); Dr SOLTWEDEL, Olaf (Institut fürPhysik Kondensierter Materie, Technische Universität Darmstadt,); Dr BENDER, Philipp (Heinz Maier-Leibnitz Zentrum (MLZ), Technische Universität München); Dr LEINER, Jonathan (Physik Department,Technische Universität München); Prof. PFLEIDERER, Christian (Physik Department, Technische Universität München)

Presenter: JOCHUM, Johanna

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