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# Modulation of intensity with zero effort - a neutron spin echo technique

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Conventional neutron spin echo (NSE) is an ultra - high energy resolution technique, offering energy resolutions down to <1 neV [1]. However, classical NSE is limited in the range of high energy transfers, reaching an energy resolution of 0.2 meV at best.
Longitudinal neutron resonant spin echo (LNRSE) and longitudinal modulation of intensity with zero effort (LMIEZE) are able to overcome this limitation of classical NSE and NRSE by means of the effective field subtraction method [2]. In NRSE the solenoids of the classical NSE setup are replaced by a pair of resonant spin flippers.

MIEZE is a NRSE technique, that is insensitive to depolarising (e.g. magnetic) samples, as well as depolarising sample environments, such as magnetic fields. Furthermore, MIEZE does not produce the 2/3 background arising from incoherent scattering that is present for classical NSE and NRSE and is therefore well suited for hydrogen containing or other incoherently scattering samples.
In essence, MIEZE is a high-resolution, spin-echo, time-of-flight (TOF) technique where all beam preparation is performed in front of the sample. Typical applications for MIEZE are the investigation of quantum phase transitions, superconductors, vortex lattices, skyrmions, ferromagnetic materials and hydrogen containing samples [3].

[1] B. Farago et al., Neutron News 26 (3) (2015) 15
[2] M. Krautloher et al., Rev. Sci. Instrum. 87 (12) (2016) 125110
[3] C. Franz et al., J. Phys. Soc. Jpn. 88 (8) (2019)
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