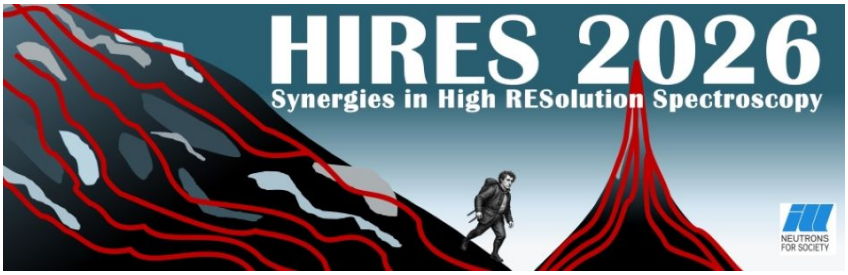

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Nested mirror optics for neutron resonant spin-echo instrument RESEDA

RESEDA is a neutron resonance spin-echo (NRSE) spectrometer at FRM II that provides a flexible range of possible energy and momentum transfers by offering two modes of operation: the NRSE option, which has the advantage of providing larger spin-echo times and the possibility to measure at large scattering angles, and the MIEZE option, which is robust against depolarizing conditions at the sample position. The recent upgrades at RESEDA focused on improving the energy resolution of the MIEZE option and on adapting the instrument for the use of thermal neutrons. The potential result of these upgrades is access to MIEZE at large momentum transfers, allowing investigation of a new range of phenomena such as frustrated magnetism.

As one of the next steps in the instrument's development, it was proposed to install nested mirror optics (NMOs) at the instrument to allow neutron beam focusing at several places such as radio-frequency (RF) flippers or the sample position [1]. Focusing at the RF flippers will allow the use of smaller AC field coils while increasing neutron beam size, thus improving RF flippers performance and increasing total neutron flux. Focusing the beam at the sample position would allow efficient experiments with samples with small cross sections, such as those used in high-pressure measurements or single crystals that are difficult to grow. For the MIEZE mode, this also helps to suppress phase aberrations, allowing measurements at large scattering angles.

In this contribution, we present the plans for NMO integration into RESEDA with the preliminary simulation results.

[1] C. Herb et al., Nuclear Inst. and Methods in Physics Research, A 1040, 167154 (2022)

Session

Instrumentation

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