

Researchers develop new radio frequency spin flippers for neutron resonance spin echo

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RFSF installed in RESEDA.

Neutron spin echo is a well-known scattering technique to explore



structural and magnetic dynamics in soft and condensed matter with subµeV energy resolution. Radio frequency spin flippers (RFSF) are key elements of neutron resonance spin echo (NRSE) spectrometers. With these, scientists can perform controlled manipulations of beam polarization. A group of scientists who work as part of the NMI3 Joint Research Activity on Advanced Methods and Techniques has designed and tested a new type of RFSF using an original manufacturing technique for the static coil.

The procedure to build the flippers is largely automated, which ensures it is reproducible and achieves homogeneity of the neutron magnetic resonance condition over the coil volume. Two salient features of this concept are the large neutron window and the closure of the coil by a μ -metal yoke, which prevents field leakage outside of the coil volume. These properties are essential for working with large beams and enable new applications with coils tilted with respect to the beam axis such as neutron Larmor diffraction or the study of dispersive excitations by inelastic NRSE.

The RFSF was developed for the NRSE instrument RESEDA at the Maier-Leibnitz Zentrum in Germany. They are well suited to upgrade existing cold <u>neutron</u> based NRSE <u>spectrometers</u> or to build new versatile instruments, as it is the case of the future European Spallation Source.

More information: N. Martin, J. N. Wagner, M. Dogu, C. Fuchs, L. Kredler, P. Böni and W. Häußler (2014) "Neutron resonance spin flippers: Static coils manufactured by electrical discharge machining," *Rev. Sci. Instrum.* 85, 073902; <u>dx.doi.org/10.1063/1.4886383</u>

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Scattering and Muon Spectroscopy

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