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The new high-resolution J-NSE "PHOENIX"at MLZ

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Neutron spin echo (NSE) spectroscopy provides the ultimate energy resolution in quasi-elastic thermal and cold neutron scattering spectroscopy. In 2017 the Jülich neutron spin echo at MLZ went through a refurbishment of the secondary spectrometer: The old normal conducting main-precession coils have been replaced by a new set of fringe-field compensated, superconducting magnets that were realized following the results obtained for the design of ESSENSE, the proposed high-resolution NSE spectrometer at the ESS. One of the most innovative characteristics of the coils is their optimized geometry that maximizes the intrinsic field-integral homogeneity along the flight-path of the neutrons and that enhances the resolution of a factor 2.5, as the first experiments could already confirm. The new configuration yields an improved resolution that may be exploited to reach larger Fourier-times and/or to benefit from significant intensity gains if shorter neutron wavelengths are used at a given Fourier-time. Thus the new J-NSE Phoenix meets the needs to look into the microscopic dynamics of soft- or –biological matter with enhanced and new quality. Here we present the results on the performance of the spectrometer after the refurbishment and some selected examples from the realm of soft matter dynamics that largely rely on the enhanced properties of the new J-NSE.

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