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High resolution neutron spectroscopy with the J-NSE "PHOENIX"

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Neutron spin echo (NSE) spectroscopy provides the ultimate energy resolution in quasi-elastic thermal and cold neutron scattering spectroscopy. In terms of Fourier-time (τ) high resolution means the extension of τ into to the regime of μs (corresponding to an energy resolution of ~neV). The J-NSE "PHOENIX" with its unique fringe-field compensated, superconducting magnets provides the state of the art in NSE instrument design. 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 compared to the previous normal conducting setup. The increased resolution 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 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 in its current configuration and some selected examples from the realm of soft matter dynamics that exploit the unique properties of the new J-NSE.

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