

# Passive Magnetic Shielding for the J-NSE “PHOENIX”

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The current J-NSE represents at the moment the best known design of an NSE Spectrometer, enabling measurements with correlation times up to several 100 nanoseconds in routine operation. An important area of science at the J-NSE is the investigation of domain motion in large proteins under physiological conditions, a unique capability of NSE, requiring extremely high precision measurements since deviations in relaxation from diffusive behavior needs to be quantified.

However, a major source of instrument downtime or increased sources of noise and systematic error in the data are magnetic field variations in the area of the J-NSE spectrometer coming from sources like magnets, the crane, relocated steel plates, moving polarization analyzers. Measures have been started to reduce the influence of those stray fields, which affect the NSE already on scales down to mG.

The most elegant and robust solution, which proved to work excellently for NSE instruments, is the double layer  $\mu$ -metal housing as it is provided for the SNS-NSE in Oak Ridge. It has to surround the full instrument, also the floor needs to be included into the housing, and the housing needs to be large enough such that the mirror fields inside the cage do not reduce the resolution of the instrument. Options and requirements for such a magnetic shielding at the J-NSE “PHOENIX” will be presented.

Precision measurements of small effects at highest resolution in the dynamics would gain significantly in quality with such a passive magnetic shielding.

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