

SLOW MOTION OF LARGE MOLECULES

Neutron Spin Echo Spectroscopy with the J-NSE "PHOENIX"

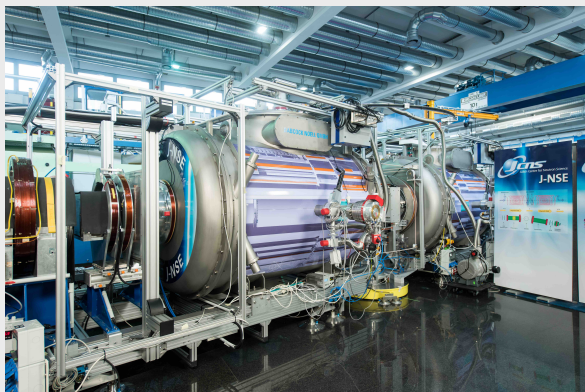
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Fluctuations in Soft Matter Systems

- Neutron Spin Echo (NSE) Spectroscopy provides the highest energy resolution in neutron scattering
- Thermally driven fluctuations of molecules can be measured
- Labcourse experiment: Dynamics of a polymer chain in solution

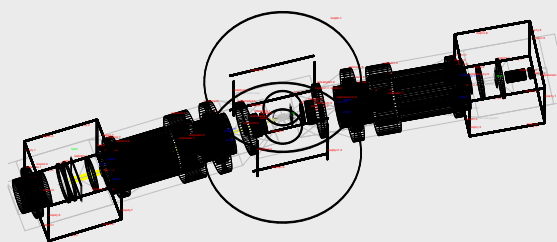
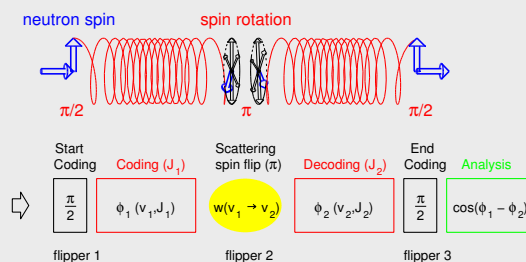
Impressions and examples of NSE experiments

The J-NSE "PHOENIX"



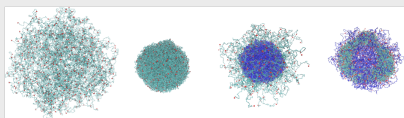
- Superconducting Neutron Spin Echo Spectrometer
- Spin Encoding of velocity change
- Automated magnetic setup
- S. Pasini et al., Rev. Sci. Instrum. 90, 043107 (2019)

Principle of spin encoding in the neutron spin echo spectrometer



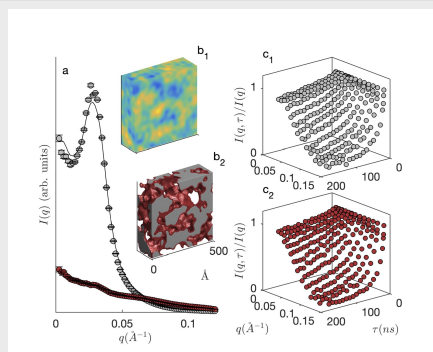
Magnetic coil design of the main solenoids

Microgels with complex architecture



Microgels with core-shell structure: Combining NSE and mesoscale hydrodynamic simulations allows to access details of the partly collapsed domains inaccessible otherwise. S. Maccarrone et al., Macromolecules 49 (9), 3608-3618 (2016)

Microemulsions modelled with Gaussian Random Fields

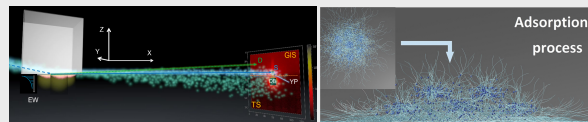


C. Gommès, J.

Chem. Phys. 2021

Combined simulation of structure and dynamics of bicontinuous microemulsions with Gaussian Random Field models.

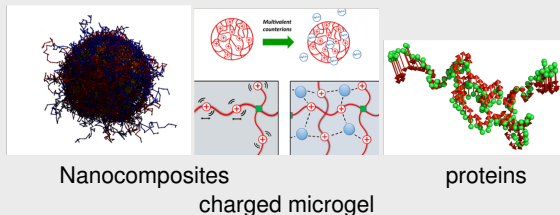
Surface sensitive measurements



T. Kyrey et al., J. Appl. Cryst 2021, Polymer 2019, Soft Matter 2019

- Near interface dynamics
- Complementary to structure with GISANS
- Membrane dynamics, Brushes, Microgels
- e.g. structure of microgels in solution and at interfaces

Examples: Polymers, Microgels, Proteins



C. Mark et al., PRL 2016

S. Maccarrone et al., Macromolecules 2016

A. Stadler et al., JACS 2014