

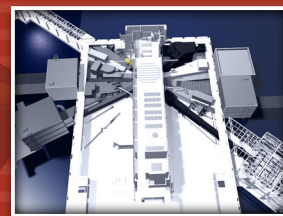
INSTRUMENT

BEAM LINE

1A

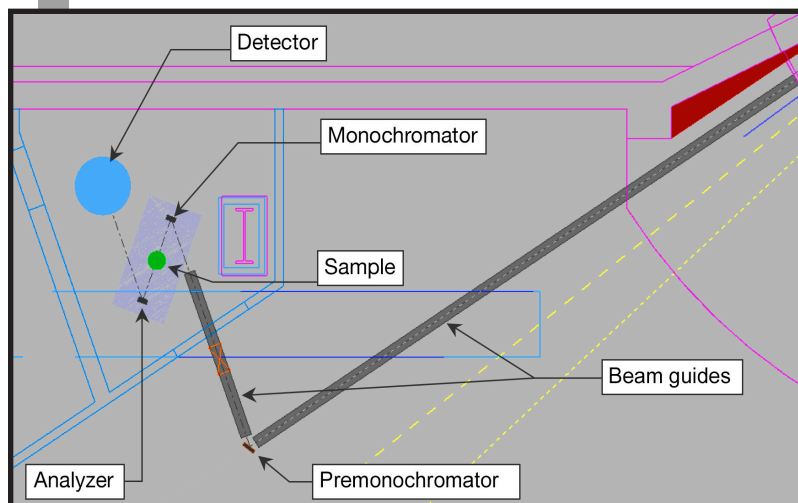
SPALLATION NEUTRON SOURCE

Fact Sheet



USANS – ULTRA-SMALL-ANGLE NEUTRON SCATTERING INSTRUMENT

The USANS instrument is designed for the study of hierarchical structures in natural and man-made materials. It can be considered an advanced version of the classical Bense-Hart Double-Crystal Diffractometer (DCD), which, in contrast with its single-wavelength reactor-based analog, will operate with the discrete multiwavelength spectrum of Bragg reflections. The optical scheme of the USANS instrument is similar to that of the



conventional Bense-Hart DCD; however, the pulsed nature of SNS offers an opportunity to separate the orders of Bragg reflection in time space using the time-of-flight technique. Thus, the concept of the USANS technique allows optimization of the neutron flux and the Q resolution, following the principles of dynamical diffraction theory.

SPECIFICATIONS

| | |
|----------------------------|---|
| Moderator | Decoupled poisoned hydrogen |
| Source-detector distance | 30 m |
| Focusing premonochromator | Cooper mosaic Cu(111) crystals |
| Monochromator and analyzer | Si(220) channel-cut, triple-bounce crystals |
| Bragg angle | 70° |
| Wavelength spectrum | 4 Bragg reflections at 3.6, 1.8, 1.2, 0.9 Å |
| Q range | $7 \times 10^{-6} \text{ \AA}^{-1} < Q < 5 \times 10^{-3} \text{ \AA}^{-1}$ |

Status: Under construction



Discrete multiwavelength spectrum created by a family of Bragg reflections.

APPLICATIONS

Ultra-small-angle neutron scattering provides a new way to solve a broad range of scientific problems such as

- Supramolecular structure of polymer blends
- Macroscale self-similarity of rocks
- Structure of colloidal crystals and alloys
- Hydration of cement pastes
- Aggregation in colloidal dispersions
- Self-assembling of polymers
- Mesoscopic structure of natural composites
- Structure of granular powders
- Morphology of colloidal reinforcing fillers
- Structure and morphology of complex fluids
- Rheology and morphology of hydrogels

FOR MORE INFORMATION, CONTACT

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