

# INSTRUMENT

BEAM LINE

# 1A

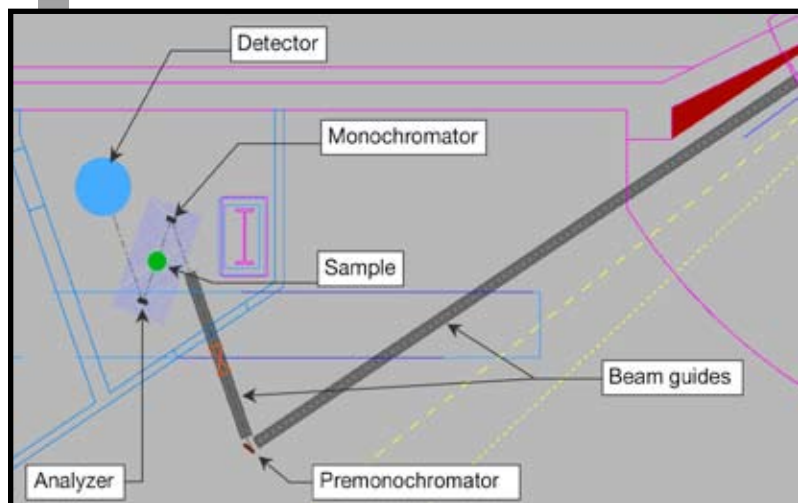
SPALLATION NEUTRON SOURCE

# Fact Sheet



## TOF-USANS — TIME-OF-FLIGHT ULTRA-SMALL-ANGLE NEUTRON SCATTERING INSTRUMENT

The TOF-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 TOF-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 TOF-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  | Germanium mosaic Ge(220) crystal  |
| 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                    | $7 \cdot 10^{-6} \text{ \AA}^{-1} < Q < 5 \cdot 10^{-3} \text{ \AA}^{-1}$ |

Status:  
To be commissioned in 2014



*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 pasts
- 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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