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## SANS-II: Risø-SANS instrument installed at SINQ

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SANS-II, the former Risø-SANS instrument, has been installed at SINQ in middle of the year 2002. It has been upgraded in several details, e.g. by the installation of a new velocity selector and is in the routine operation since August 2002.

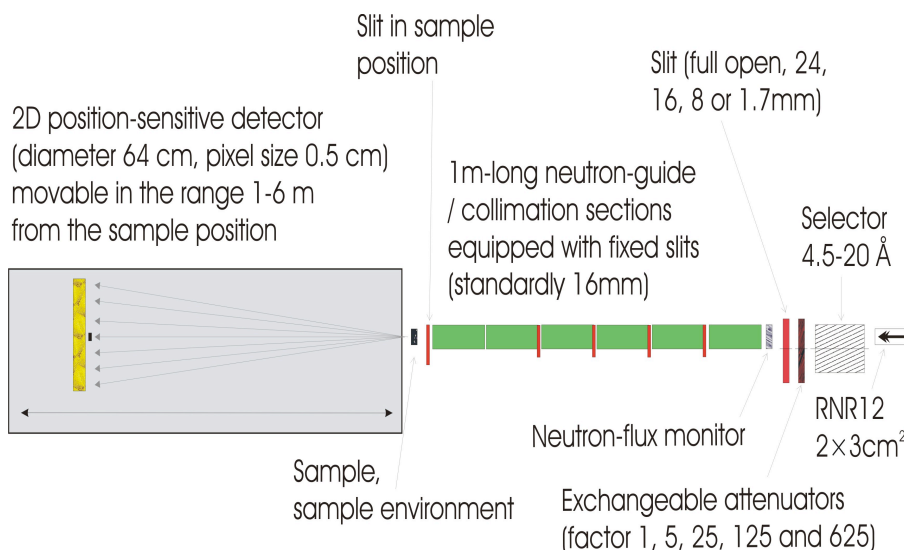
As for the other PSI-Risø instruments, **half of the beamtime time is reserved for the Danish user community**, whereas the other half is scheduled via the [SINQ proposal system](#).



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**Instrument Description**

Main characteristics of this Small-Angle Neutron Scattering instrument (see Fig.) are as follows:

- neutron wavelength range 4.5 - 20 Å
- beam collimation 1-6 m (moveable one-meter sections)
- sample-to-detector distance (SDD) 1-6 m
- area detector, diameter 64 cm, 128x128 pixels
- accessible Q -range: 0.002 – 0.35 Å<sup>-1</sup> (i.e. inhomogeneity-size range 15 – 1500 Å)
- flux in the sample position for 4 m collimation and  $\lambda=4.5$  Å: 30000 n/s/cm<sup>2</sup> /mrad<sup>2</sup> /mÅ



#### Beam formation

SANS-II facility is installed at SINQ neutron guide RNR 12. The incoming neutrons are monochromized by a mechanical velocity selector. Collimation is performed in the six meter long collimation section. It consists of one fixed and five moveable one-meter sections in which nickel-coated neutron guides can be inserted individually by computer-controlled pneumatic cylinders allowing the neutron source pin-hole to be moved from one to six meters in steps of one meter away from the sample position.

#### Sample environment

The whole system, i.e. collimators, sample chamber and detector tank can be operated in a single vacuum system without windows in order to lower background. In that case, 7-position sample exchanger (with temperature control in the range 6-80°C), or 2-position furnace (up to 300°C) can be employed. The sample chamber can be, however, also fully removed and a rotation table can be installed instead. This option enables to use of bulky and heavy equipment such as cryomagnet or shear devices. The new SANS-II sample table is under construction, another table can be however used (standard equipment at SANS-I). The sample environment available at SINQ is gradually integrated to SANS-II systems.

#### Detection of scattered neutrons

The area-sensitive multi-wire proportional neutron detector has been developed at Risø National Laboratory. The active volume is 64 cm in diameter and 4.5 cm thick and the total gas volume is 15.2 litres. The normal filling is 1 atmosphere  $^3\text{He}$  plus 1.5 atmosphere argon and methane, which combines high efficiency, high spatial resolution and low  $\gamma$ -ray sensitivity. The gas is purified by convective circulation through an activated alumina filter, which is mounted in an enclosed space on the back of the detector together with the preamplifiers. The detector can be used in an evacuated space. The xy-positioning of the detected neutron is based on the difference in rise-times for pulses arriving at the two ends of the wire-grids. The anode grid is used for one coordinate and the two cathode grids, coupled in parallel after the preamplifiers, are used for the other coordinate.

The detector can be moved continuously from one to six meters away from the sample position.

#### Q -range

The accessible range is  $2.10 \cdot 3 \text{ \AA}^{-1} < Q < 0.35 \text{ \AA}^{-1}$ .

The full Q -range can be obtained by measuring at three geometries:

- 1) SDD= 6 m,  $l = 19.6 \text{ \AA}$ :  $0.002 \text{ \AA}^{-1} < Q < 0.014 \text{ \AA}^{-1}$
- 2) SDD= 5 m,  $l = 4.55 \text{ \AA}$ :  $0.010 \text{ \AA}^{-1} < Q < 0.075 \text{ \AA}^{-1}$
- 3) SDD= 1 m,  $l = 4.55 \text{ \AA}$ :  $0.050 \text{ \AA}^{-1} < Q < 0.35 \text{ \AA}^{-1}$ .

#### Intensity at sample position

Compared to SANS-I:

- A) for identical resolution: SANS-II = 0.7 of SANS-I
- B) for relaxed resolution and maximum flux: SANS-II = 0.2 of SANS-I

A brief description of beam line operation can be found [here](#).