

# REGIONAL LABORATORY OF NEUTRONOGRAPHY

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Institute of Atomic Energy

The Regional Laboratory of Neutronography (RLN) provides experimental facilities and research experience in the field of thermal neutron scattering studies of condensed matter and material engineering. The laboratory operates six horizontal channels of the MARIA reactor and six instruments designed for elastic and inelastic neutron scattering. A beam time allocation at our facility can be applied for by submitting proposals directly to the responsible researchers mentioned below or to Prof. A. Czachor. Proposals are evaluated by the Project Selection Board of the RLN which consists of the representatives of institutes and universities interested in doing research using neutron scattering at the RLN. The Board's Chairman is Prof. L. Dobrzyński of the Soltan Institute for Nuclear Studies, Świerk.

## Available instruments at horizontal channels (H 3-7) and responsible researchers.

**H3-a** - double axis diffractometer to study crystalline or magnetic structures. Zn, PG, Cu(200) and Si(311) monochromators are available. The range of scattering angles – 0° - 90°. The energy analysis of the scattered neutrons is also possible.

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**H3-b** - small angle neutron diffractometer designed for studies of inhomogeneities like precipitations and micropores in materials ( $\lambda = 2 \text{ \AA}$ ,  $Q_{\min} \approx 0.01 \text{ \AA}^{-1}$ ).

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**H4** – small-angle double-crystal neutron diffractometer. The instrument operates with monoenergetic neutrons ( $\lambda = 1.5 \text{ \AA}$ ) monochromatized and analyzed with the (111) Bragg reflection from Si single crystals. The full-width at half maximum of the instrumental distribution is in the region  $30'' \div 40''$ . The angular distribution of transmitted neutrons may be measured in steps of  $0.125''$ . The instrument is designed for studies of the average size of magnetic domains, large precipitations, or other micro-objects that cause neutron scattering.

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**H5** – enhanced resolution diffractometer equipped with Cu (200) double-crystal monochromator; angular resolution  $\sim 4'$ ; neutron wavelength range  $0.6 - 1 \text{ \AA}$ ; scattering angle range  $0^\circ - 110^\circ$ . It may be used as the polarized neutron spectrometer. Polarized neutron beam is then produced by two subsequent Bragg reflection, first from the (200) plane of the Cu monochromator and then - from magnetized Co-Fe single crystal.

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**H6** - triple-axis spectrometer. The instrument is designed for studies of the crystal and magnetic lattice

dynamics by inelastic neutron scattering. The instrument is equipped with PG (FWHM =  $0.4^\circ$ ) monochromator, analyzer and filter set; neutron flux density at the sample position is  $5.1 \cdot 10^5 \text{ n/cm}^2 \text{ s}$  for  $\lambda = 2.35 \text{ \AA}$ . The range of scattering angles  $10^\circ - 110^\circ$ .

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**H7** - triple-axis spectrometer, designed for the inelastic neutron scattering studies. PG monochromator, analyzer and filter set is installed. Zn monochromator (FWHM =  $15'$ ) and analyzer set is also available with neutron flux density at the sample position  $5.5 \cdot 10^5 \text{ n/cm}^2 \text{ s}$  for  $\lambda = 1.523 \text{ \AA}$ . The range of scattering angles  $10^\circ - 110^\circ$ .

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Each instrument is computer controlled using the unified computer code. The program offers the window system with text and graphics modes, zooming option for data extraction and visualization of measurement results. Available sample environment includes helium microcooler (8 K – 300 K), liquid nitrogen cryostats, vacuum furnaces and magnets. The sample environment parameters can be registered in real time during measurements. The arrangement of neutron scattering instruments in the reactor hall is presented in Fig. 1. The neutron and gamma radiography facility installed at the H8 horizontal channel is described in the next section.

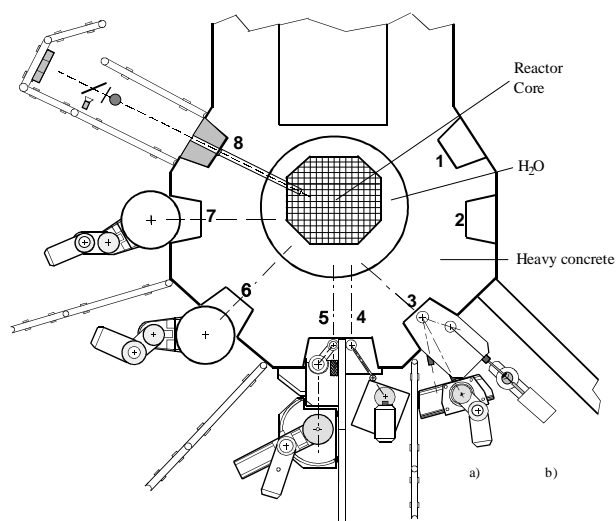


Fig. 1. Floor plan of the neutron spectrometers of RLN in the Maria reactor hall