
DEVELOPMENT OF NEUTRON SCATTERING TECHNIQUES AND INSTRUMENTS

DEVELOPMENT OF LINEAR POSITION-SENSITIVE NEUTRON DETECTOR FOR MODERN NEUTRON SOURCES

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In the frame of creation of scientific instruments at the PIK research reactor complex, a new thermal neutron powder multi-detector diffractometer D3 is being developed for researches at the field of condensed matter under high pressures. An assembly of 96 (6x16) linear position-sensitive helium detectors with charge division is proposed to register the scattered neutrons at D3. Required parameters of the helium-filled tubes are: length 600 mm, diameter 8 mm, spatial resolution along the anode should be at least 3 mm.

Linear position-sensitive thermal neutron detectors (LPSD) operating on the principle of charge division are reliable, time-tested devices. However, high intensity of neutron beams at new modern sources can lead to overloads of existing models and dramatic reduction of spatial resolution. Degradation of the anode wire at high neutron fluxes can also lead to a drastic reduction in the service life of the detectors.

In order to solve this problem, the cooperation of the National Research Center "Kurchatov Institute" - PNPI and the Joint Institute for Nuclear Research initiated development of LPSDs and electronic systems capable of working on modern neutron sources. The first results of this work are presented in this report. The registration part was designed and manufactured in collaboration with the "SPF Consensus" firm (Russia). Two assemblies of the electronic system for these LPSDs were developed by JINR and NRC "Kurchatov Institute" - PNPI. Prototypes of the registration systems were made and their parameters were defined in cooperation with a neutron sources laboratory and with the neutron beam of the IR-8 research reactor at the NRC "Kurchatov Institute".