

## PIK reactor complex

*Saturday, 16 July 2022 12:15 (35 minutes)*

A review of the parameters and the state of affairs in the construction of the one of the most powerful neutron sources the PIK research reactor (National Research Center "Kurchatov Institute" - PNPI, Gatchina, Russia) will be presented.

The PIK reactor is a neutron source with record parameters, designed to become the flagship of neutron research in Russia. It is a pressurized vessel reactor, where light water (H<sub>2</sub>O) is used as a coolant, and heavy water (D<sub>2</sub>O) as a neutron reflector and moderator. The main design characteristics of the reactor are as follows [1]:

- Thermal power - 100 MW;
- The volume of the reactor core - 50 liters
- Thermal neutron flux in the moderator -  $1.2 \cdot 10^{15} \text{ n/cm}^2\text{s}$ ;

To extract neutron from the moderator, as well as to irradiate samples, the PIK reactor is equipped with a significant number of experimental channels.

The central experimental channel (CEC) is located in the water cavity of the reactor core. The thermal neutron flux density in the cavity is  $5 \cdot 10^{15} \text{ n/cm}^2\text{s}$ ;

- Horizontal experimental channels (HEC) – 9 items;

Thermal neutron fluxes at the channel bottoms  $(0.1-1.2) \cdot 10^{15} \text{ n/cm}^2\text{s}$

Thermal neutron fluxes at the exit of channels  $(0.2-3) \cdot 10^{11} \text{ n/cm}^2\text{s}$

Channel diameters - 100–250 mm

- Inclined experimental channels (NEC) - 6 items;

Thermal neutron fluxes at the bottoms -  $(0.2-1) \cdot 10^{15} \text{ n/cm}^2\text{s}$

Currently, the PIK reactor is under commissioning with the scheduled step-by-step increasing the power, the 5 "first-day" neutron scattering instruments have been put into operation, and the first experiments are being carried out.

This facility will determine the development strategy for neutron research in the Russian Federation for several decades and will become the basis of the International Center for Neutron Research [2].

[1] Kovalchuk, M. V., Smolskiy, S. L., & Konoplev, K. A. Research Reactor PIK. Crystallography Reports, 66(2) (2021) 188-194

[2] Kovalchuk, M.V., Voronin, V.V., Grigoriev, S.V. et al. Instrument Base of the Reactor PIK. Crystallogr. Rep. 66, 195–215 (2021)

### The speaker is a student or young scientist

No

### Section

1. Synchrotron and neutron radiation sources and their use in scientific and applied fields

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