

2.1. THE IBR-2 PULSED REACTOR

The IBR-2 research nuclear facility is operated under Rostechнадзор license № ГН-03-108-2614 of 27.04.2012.

In 2013, in accordance with the license requirements the specialized organizations in cooperation with the IBR-2 personnel performed the scheduled work on the technical evaluation and assessment of the remaining life of the technological reactor equipment. The activities to prolong the service life of the equipment of the IBR-2 safety-related systems have been completed.

Since January 2013 regular IBR-2 cycles of physical experiments have been carried out at a power of 2 MW with the CM-202 moderator operating either in the water or cryogenic mode depending on the schedule of the physical start up of the cold moderator.

From September 13 to September 19 a fresh fuel assembly was loaded into the IBR-2 reactor core and the reactor was brought to criticality in a steady-state operation mode followed by an assessment of the efficiency of the loaded fuel assembly and of the integrated efficiency of the regulating units of the control and safety system. The reactor was turned on to a power of 250 kW followed by an assessment of the efficiency of the loaded fuel assembly at pulsed criticality.

The **table 1** presents data on the IBR-2 operation for physics experiments in 2013.

Table 1. Data on the IBR-2 operation for physics experiments.

№ cycle	Period	Moderator type	Reactor operation for physics experiments, hr
1	22.01-30.01	cryogenic	176
2	11.02-22.02	water	260
3	18.03-29.03	cryogenic	264
4	09.04-20.04	water	242
5	21.05-02.06	water	281
6	23.09-04.10	water	262
7	14.10-22.10	water	169
8	24.10-01.11	cryogenic	174
9	11.11-18.11	water	170
10	21.11-23.11	cryogenic	44
11	29.11-13.12	water	330
12	17.12-26.12	cryogenic	206
Total:			2578

2. NEUTRON SOURCES

In 2013, in accordance with the contract with the JSC "Dose" the dosimetry equipment for the stationary radiation monitoring system (RMS) of IBR-2 was delivered. Its installation and adjustment began.

2.2. IREN FACILITY

In 2013, in FLNP the scientific activity in the field of neutron nuclear physics was carried out in the following traditional directions: investigations of time and space parity violation processes in neutron-nuclear interactions; studies of the fission process; experimental and theoretical investigations of fundamental properties of the neutron; gamma-spectroscopy of neutron-nuclear interactions; atomic nuclear structure, obtaining of new data for reactor applications and for nuclear astrophysics; experiments with ultracold neutrons. The greater part of the fundamental investigations was conducted IREN pulsed resonance neutron source. In 2013 the IREN facility operated for physical experiments for about 1050 hours.

2.3. EG-5 ACCELERATOR

In 2013, the EG-5 accelerator operated for various experiments for 656 hours. Studies of elemental depth profiles using nuclear-physical analytical methods RBS (Rutherford backscattering) and ERD (elastic recoil detection) were conducted in cooperation with representatives of various institutes of the JINR Member States. Employees from FLNR (V.F. Reutov, A.Yu. Didyk), DLNP (V.M. Bystritskii), VSU (V.M. Vakhtel), TPU (V.V. Sokhoreva), UMCS (D. Monchka, M. Kulik), IEE SAS (Y. Guran, D. Makhaydik) participated in the experiments. Samples of different elemental composition and various preparation technologies were analyzed; in particular, elemental depth profiles in the samples of nanocrystalline silicon carbide films prepared using PECVD (plasma-enhanced chemical vapor deposition) technique were investigated. The study of electrical and optical characteristics of the films based on their elemental composition was performed.

Depth profiles of hydrogen and deuterium were also studied by nuclear-physical analytical methods RBS and ERD in the samples prepared for the study of nuclear reaction $d(d, \gamma)^3\text{He}$ at low energies.