

2. NEUTRON SOURCES

THE IBR-2 PULSED REACTOR

Information on the operation of the IBR-2 research nuclear facility

The IBR-2 research nuclear facility operated under Rostekhnadzor license № GN-03-108-2614 of 27.04.2012 and Rostekhnadzor license № GN-03-108-2871 of 30.04.2014.

On February 9, 2014 in accordance with JINR order №67 issued on 02.07.2014 the IBR-2 operation was terminated due to the expiry of the Rostekhnadzor license № GN-03-108-2614 of 27.04.2012 for operating the research nuclear facility IBR-2. On May 5, 2014 JINR obtained Rostekhnadzor license № GN-03-108-2871 issued on 30.04.2014 by the Federal Service for Ecological, Technological and Nuclear Supervision for operating the research nuclear facility IBR-2. In accordance with JINR Order of May 6, 2014, the operation of the research nuclear facility IBR-2 at a power of 2 MW was permitted to be resumed from May 12, 2014.

In 1, 3-6, 8 and 9 cycles the CM-202 moderator operated in a water moderator mode; in 2, 7 cycles – in a cryogenic mode.

The table presents data on the IBR-2 operation for physics experiments in 2014.

№ cycle	Period	Reactor operation at power, hr	Reactor operation for physics experiments, hr	Moderator type
1	13.01-24.01	284	267	water
2	30.01-08.02	213	201	cryogenic
3	13.05-29.05	405	390	water
4	03.06-11.06	172	163	water
5	22.09-06.10	334	326	water
6	13.10-27.10	332	327	water
7	31.10-09.11	193	187	cryogenic
8	21.11-08.12	404	398	water
9	15.12-26.12	239	233	water
Σ		2576	2492	

Project: “Complex of cryogenic moderators of the IBR-2 reactor”

In 2014, in accordance with the IBR-2 operation schedule two cycles of CM-202 operation in a cryogenic moderator mode were conducted.

The main activities carried out in the framework of theme 1105 “Development of the IBR-2 Facility with a Complex of Cryogenic Neutron Moderators” were:

- A contract for the purchase of a refrigerator by Linde AG 1200W 10K was concluded.
- A technical proposal for designing the refrigerator equipment layout was developed.
- A contract with JSC SSDI for designing the refrigerator equipment layout was concluded.
- A cryostat KV6640.00 with two gas blowers was installed on IBR-2 beamline № 3 in accordance with the plan of construction of cryogenic moderator complex. In-service thermophysical tests of the cryostat were performed.

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- A test stand of CM-201 was assembled in accordance with the project design of the FLNP Design Bureau.
- Experiments on loading mesitylene beads into the test stand chamber were carried out. Studies on filling the cryogenic moderator chamber with beads of mesitylene-naphthalene mixture to determine the neutron-physical characteristics and to test the radiation resistance of the mixture.

IREN FACILITY

Throughout almost the entire first half of 2014, from January 17 to May 23 (1358 hours) IREN operated for the program of irradiation of scintillator samples of the hadron calorimeter CMS, which was drawn up by the specialists from VBLHEP. Over one hundred samples of scintillators were irradiated; their radiation characteristics were studied and relevant data were obtained that can be used to increase their radiation resistance.

In the second half of 2014 the IREN personnel carried out a large-scale modernization of technological and electrical systems of the facility. The ventilation and air-conditioning systems of the IREN accelerator halls were upgraded, the old klystron modulators were dismantled and replaced with new high-power pulsed klystron modulators of South Korean company DAWONSYS. A representative competition was held to select a contractor for implementing the project and performing work on the modernization of the IREN power supply system. Technical specifications were developed for modernization of the power supply system as well as water cooling and temperature stabilization systems of the LUE-200 accelerator. All efforts were aimed at achieving in 2016 the design parameters of the IREN facility specified in the "road map".

EG-5 ACCELERATOR

In 2014, the EG-5 accelerator operated for experiments for 665 hours. A large number of analytical studies were carried out with various samples. The samples were provided by the JINR Laboratories (FLNP, DLNP, FLNR), institutes of Russia (A.M.Prokhorov General Physics Institute, St.Petersburg Nuclear Physics Institute, Voronezh State University), institutions from JINR Member States (Maria Curie-Skłodowska University, Lublin, Poland, Institute of Electrical Engineering SAS, Bratislava, Slovakia; Institute of Physics, Belgrade, Serbia) and by students from South Africa. As a result of the studies depth profiles of various elements in near-surface layers of the samples were obtained with a depth resolution of about 5 nm. A.P.Kobzev published in the journal *Physics of Elementary Particles and Atomic Nuclei*, 2014, vol.45, N3 his work "On the radiation mechanism of a uniformly moving charge", suggesting a detailed explanation of the mechanism for the Vavilov-Cherenkov radiation and the transition radiation, which does not require violation of fundamental laws of physics. It is shown that the erroneous "mechanism of radiation during uniform motion of a charge" has given rise to a great number of unreal effects becoming widespread in the publications of many contemporary authors.