

I. General considerations

The Scientific Council takes note of the comprehensive report by the JINR Director, G. Trubnikov, covering the decisions of the latest session of the Committee of Plenipotentiaries of the Governments of the JINR Member States (9–10 November 2023), the results of the implementation of the Seven-Year Plan for the Development of JINR (2017–2023), the progress in the realization of the projects included in the Topical Plan for 2024 as well as recent events in JINR's international cooperation.

The Scientific Council appreciates the impressive results in developing JINR's large research infrastructure, the Institute's significant contribution to international cooperation, especially at CERN, as well as JINR's recent achievements:

- completion of the production and cryogenic testing of components of the collider's magnetic system, readiness for commissioning the power supply system for the structural elements of the collider, preparations for the launch of a new cryogenic compressor station, beginning of the implementation of an educational programme to train operators involved in commissioning and operation of the NICA complex;

- progress in the reconstruction of raw experimental data recorded by the BM@N experiment, in particular, the reconstruction of statistically significant signals of Λ - and Ξ -hyperons and K^0_s -meson for further physics analysis;

- progress in the production of all components of the MPD first-stage detector with minimal delays;

- presentation of the updated SPD Technical Design Report (TDR) at the PAC meeting in January 2024, and the start of a review process of the updated TDR by the new international Detector Advisory Committee (DAC) appointed in December 2023;

- development of the ARIADNA collaboration, whose applied research programme was launched at the NICA complex in the beginning of 2023, testing of the SOCHI station with the Ar beam, and installation of two other stations – SIMBA and ISCRA;

- successful participation of the Institute in the work of collaborations at CERN, as well as the high level of JINR's activity in the fulfilment of its obligations under the programme for the second phase of upgrade of the ATLAS, CMS, and ALICE detectors at the CERN-LHC complex;

- progress in developing the Baikal-GVD deep-water neutrino telescope, installation of 576 optical modules and 2 bottom cable lines in 2023, as well as manufacturing 470 optical modules for installation during the 2024 expedition;

– successful continuation of experiments at the Factory of Superheavy Elements, in particular, the observation of 2 events of the new isotope ^{288}Lv in the reaction $^{54}\text{Cr}+^{238}\text{U}$, which is also an important stage in preparation to the synthesis of the new element 120 in the $^{54}\text{Cr}+^{248}\text{Cm}$ reaction;

– progress in developing the DRIBs-III accelerator complex with the modernization of the U-400M cyclotron with the first beam expected in the spring of 2024, the progress of construction work for DC-140 with commissioning expected at the end of 2024, as well as the planned implementation of the construction work in the new experimental hall of U-400R;

– successful implementation of the working plan to prepare for continuing the regular operation of the IBR-2 reactor, and progress in the development of the spectrometer complex, in particular, the wide-aperture backscattering detector (BSD-A) for the high-resolution Fourier diffractometer, small-angle neutron scattering/neutron radiography detector (SANSARA), and an inelastic neutron scattering spectrometer in inverse geometry (BJN);

– further active development of fundamental and applied areas of research related to life sciences and condensed matter physics due to the development of the interlaboratory research programme at the Laboratory of Radiation Biology;

– successful work of the Bogoliubov Laboratory of Theoretical Physics and important results in particle, nuclear, condensed matter physics, and advanced mathematical physics, aimed, in particular, at theoretical support of the JINR experimental programme;

– successful development of the JINR MICC, including the expansion of the Govorun supercomputer, the use of the DIRAC distributed platform to support the collaborations of the NICA MPD, BM@N and SPD experiments, as well as the Baikal-GVD neutrino telescope.

III. Discussions of the Director's report

In the course of the discussions of the report by the JINR Director, G. Trubnikov, members of the Scientific Council expressed the following ideas and concerns:

– A. M. Cetto thanked the JINR Directorate for a comprehensive report on the achievements of the Institute, and also conveyed an invitation on behalf of the Director of the journal “Revista Mexicana de Fisica” to JINR scientists to submit their papers to this journal, especially in the areas where some collaboration has already been established with Mexican groups;

– R. Rashkov expressed the opinion that the Institute should make some efforts to improve the exchange of human resources and cooperation with European countries;

– C. Borcea made a proposal to publish the report by the JINR Director on the Institute's website;

– M. Spiro, President of IUPAP, raised the question of the prospects for relations between JINR and CERN.

Following comments and questions by M. Spiro, the JINR Director, G. Trubnikov, replied:

– the JINR Directorate is grateful to IUPAP for its support of our Institute and contribution to maintaining its relations with the international scientific community;

– for this year, the agreement between JINR and CERN is in force. JINR is ready to ensure full-fledged cooperation of scientists and specialists from the JINR Member States with CERN, to preserve and strengthen it under the conditions of mutually respectful recognition and fulfilment of mutual obligations by the parties, and the prolongation of the International Cooperation Agreement JINR-CERN;

– many steps have been taken to promote women researchers to high positions at JINR. So, the Scientific Council has noted the efforts of the JINR Directorate towards the optimal gender balance at JINR.

With regard to the questions asked, the JINR Director, G. Trubnikov, also made the following comments:

– papers by Russian and JINR scientists that present the most interesting and competitive results are still accepted by European journals, although many others which would have been accepted under other circumstances, are rejected;

– JINR is currently doing a lot of work to establish new scientific connections with Mexico and Brazil, find new partner journals, strengthen cooperation with influential journals, as well as increase the impact factor of the journals issued by JINR.

IV. Recommendations of the Programme Advisory Committees taken at the meetings in January 2024

The Scientific Council takes note of the recommendations made by the PACs at their meetings in January 2024, as reported at this session by I. Tserruya, Chair of the PAC for Particle Physics, V. Nesvizhevsky, Chair of the PAC for Nuclear Physics, and D. L. Nagy, Chair of the PAC for Condensed Matter Physics.

Particle physics

The Scientific Council recognizes the PAC's support for the adoption of the new Seven-year plan for the development of JINR for 2024–2030 and the plans of the JINR Directorate to focus on the priority implementation of major projects, including the flagship mega-science project NICA.

The Scientific Council congratulates the accelerator team of the NICA complex for the successful completion of the assembly of the ISCRA and SIMBO stations for applied research and the installation of the elements of the RF1 and RF2 systems in the NICA collider tunnel. The Scientific Council acknowledges the plan to fully complete the commissioning of the NICA cryogenic complex in August 2024. The Scientific Council also notes the start of a personnel training programme in preparation for the collider's commissioning in 2025.

The Scientific Council notes that the production of all components of the MPD first-stage detector is progressing with minimal delays. The Scientific Council concurs with the PAC that further progress will strongly rely on the readiness of the engineering systems in the MPD building by May 2024. Magnetic field measurements in the solenoidal magnet are scheduled to begin in June 2024.

The Scientific Council notes the successful processing of the data recorded by the BM@N experiment in 3.8 A GeV Xe+Csl collisions using the DIRAC system at the MLIT Tier-1/Tier-2 computers. The Scientific Council shares the PAC's concern about the lack of scientists for the ongoing analysis of recorded data.

The Scientific Council appreciates the appointment of the international SPD Detector Advisory Committee (DAC) and the progress in forming the SPD collaboration. It supports the PAC's recommendation that the new DAC thoroughly review the updated TDR and present a report at the next PAC session.

The Scientific Council endorses the recommendation of the PAC to extend for three years, until the end of 2027 with ranking A – the SCAN-3 project to study η - and Δ -nuclei formation at the Nuclotron, the ALPOM-2 project aimed at measuring the analyzing power of scattering reactions of polarized nucleons on various targets, and the DSS project to study the short-range spin structure of 2 and 3 nucleon correlations.

The Scientific Council concurs with the PAC in noting that commissioning of the NICA facility in the next years, together with the high priority given to the NICA flagship experiments – BM@N, MPD, and SPD, makes it questionable whether beam time will be available for other experiments, which may affect the timely realization of the SCAN-3, ALPOM-2, and DSS projects. The Scientific Council supports the PAC's recommendation

that the VBLHEP and NICA managements define an overall strategy for the availability of beam time for users for the next 2–3 years. It acknowledges the PAC’s willingness to prioritize and quantify the beam time to be allocated to these experiments once this strategy is defined.

The Scientific Council notes the proposal of a new project, “Fundamental and applied physics using beams of relativistic accelerated electrons (FLAP)”, at the linear electron accelerator LINAC-200. The task list includes the study of the controllable generation of electromagnetic radiation by relativistic electrons using functional materials, interaction of beams with surface and corrugated structures, and testing new detectors for non-destructive beam diagnostics with high spatial and time resolution. The Scientific Council endorses the PAC’s recommendation to open the new project FLAP for the period of 2025–2029 with ranking A.

The Scientific Council notes the proposal of a new project entitled “HyperNIS+SRC: HyperNuclear Intrinsic Strangeness and Short-Range Correlations,” which, at the initial stage, aims at studying the lightest neutron-rich hypernuclei, like ${}^6_{\Lambda}\text{H}$, ${}^4_{\Lambda}\text{H}$, ${}^3_{\Lambda}\text{H}$, at the HyperNIS setup. The Scientific Council seconds the PAC in supporting the proposed experiment with hypernuclei at the Nuclotron and the plans to expand the setup for the SRC study. It endorses the recommendation to approve this project until the end of 2029 with ranking A.

The Scientific Council appreciates the contributions of the JINR teams participating in the LHC and SPS experiments on physical analyses and detector upgrades.

Nuclear physics

The Scientific Council supports the work plan for scientific research and infrastructure development of JINR laboratories in the field of nuclear physics within the framework of themes and projects for 2024.

The scientific programme of the theme “Neutron Nuclear Physics” will be implemented within the framework of three projects: two scientific projects (“Investigations of neutron nuclear interactions and properties of the neutron” and “TANGRA”), and one scientific and technical project (“Modernization of the EG-5 accelerator and its experimental infrastructure”).

Within the framework of the project “Investigations of neutron nuclear interactions and properties of the neutron”, it is planned to resume measurements of angular correlations and γ -ray yields for already known p-wave resonances in various nuclei, and to search for new p-resonances and new effects promising violation of parity and T-invariance. The main work is expected to be carried out at the IREN resonance neutron source.

In 2024, it is planned to carry out a study of resonance neutron capture in ^{176}Lu and ^{177}Lu in the neutron energy range of 1–300 eV. The goal of the experiment is to study the effect of the Coriolis interaction on the structure of nuclear excited states. Research for rare fission modes (ternary, quaternary, and quinary) of nuclei will be continued for neutron induced fission of uranium isotopes ^{233}U and ^{235}U .

The area of interest of the project “TANGRA” is nuclear reactions induced by neutrons with an energy of about 14 MeV. The main areas of research in 2024:

- it is planned to measure the reaction cross sections (n, xy) for 22 elements. These data are necessary for the elemental analysis, Monte Carlo simulations of nuclear instruments, and verification of theoretical calculations;

- it is planned to measure the angular correlations of scattered neutrons and γ -rays in inelastic neutron scattering on carbon.

Within the project “Modernization of the EG-5 accelerator and its experimental infrastructure”, it is planned to replace the high-voltage system of the EG-5 facility, the main result of which will be an increase in the ion beam current from 2–3 μA to 100–250 μA while maintaining its energy and spatial stability. The SC supports the further implementation of the scientific programme for 2024 proposed within the framework of the theme “Neutron Nuclear Physics” and its projects.

The research programme at FLNR for 2024 of the theme “Synthesis and Properties of Superheavy Elements, Structure of Nuclei at the Limits of Nucleon Stability” will be implemented within two projects: “Investigation of heavy and superheavy elements” and “Light exotic nuclei at the borders of nucleon stability”. The SC supports the scientific and technical programmes for 2024 under this theme and two projects.

The project “Investigation of heavy and superheavy elements” implemented at the SHE Factory will focus on the continuation of the $^{54}\text{Cr}+^{238}\text{U}$ experiment, which is extremely important for preparing the synthesis of new superheavy elements 119 and 120. It is planned to prepare and conduct the first experiments on the spectroscopy of isotopes of superheavy elements synthesized in the reaction $^{48}\text{Ca}+^{242}\text{Pu}$. The experiment will be carried out using the GRAND separator and the detection setup GABRIELA-2 comprised by five clover high-purity germanium γ -detectors. It is expected to detect α -decays of the even-even nucleus ^{286}Fl to the first excited state ^{282}Cn .

The main task of the project “Light exotic nuclei at the borders of nucleon stability” in 2024 will be the preparation and conduct of the first experiments aimed at studying the structure of light nuclei near the borders of nucleon stability at the ACCULINNA and ACCULINNA-2 fragment separators of the upgraded U-400M accelerator. Research will

focus on studying the structure of heavy helium isotopes ${}^6,{}^7\text{He}$ and the reaction mechanisms leading to the formation of unbound exotic systems such as $4n$. In particular, elastic and inelastic scattering of ${}^6\text{He}$ on the ${}^4\text{He}$ nucleus will be studied over a wide range of center-of-mass angles, including back scattering corresponding to the $2n$ transfer. This reaction starts a series of investigations of the structure of neutron-rich nuclei and the mechanism of the neutron transfer reaction using secondary beams of helium and beryllium isotopes.

The SC supports the JINR large research infrastructure “Development of the FLNR Accelerator Complex and Experimental Setups (DRIBs-III)”. In 2024, the main efforts within this LRI will be focused on:

- providing beams with the required characteristics for the implementation of FLNR’s experimental programme at the existing accelerator complexes DC-280 (SHE Factory) and U-400;
- completing the upgrade and commissioning work at the U-400M accelerator, as well as ensuring first experiments with beams of radioactive nuclei;
- completing the construction of the DC-140 accelerator complex for applied heavy-ion investigations.

Under the project “Construction of the U-400R accelerator complex”, the improvement of the technical parameters of the components of the upgraded U-400R accelerator, the construction of a new experimental hall, as well as the designing of novel setups for this experimental hall will continue.

The project “Development of the experimental setups to study the chemical and physical properties of superheavy elements” is aimed at developing the multi-reflection time-of-flight mass spectrometer and pre-separator GASSOL based on a gas-filled superconducting solenoid.

Areas of nuclear physics research in DLNP include both classical spectrometry of radioactive isotopes and the investigation of various rare phenomena by nuclear physics methods. The section “Nuclear Physics” of the JINR Topical Plan includes one of the major DLNP scientific themes: “Non-Accelerator Neutrino Physics and Astrophysics”, which is aimed at searching for evidence of the existence of new physics beyond the Standard Model. The main directions of the theme are: investigation of double β -decay by various calorimetric and track-calorimetric methods, investigation of the properties of neutrinos from different sources, search for dark matter, etc. A significant part of the Laboratory’s scientific programme is devoted to the investigation of processes inside the nuclear reactor core using neutrinos. There are three projects in the theme: “Nuclear

spectrometry for the search and investigation of rare phenomena”, “Investigations of reactor neutrinos on a short baseline” and “Radiochemistry and spectroscopy for astrophysics and nuclear medicine”.

A significant part of the Laboratory’s manpower is assigned to the construction and commissioning of the Baikal-GVD gigaton volume neutrino telescope, which is a part of the large research infrastructure of JINR.

The SC approves the presented plans for 2024 and recommends the continued support of the experiments conducted in the frame of the DLNP nuclear physics scientific programme. The SC emphasizes the importance of efforts to further improve the experimental base at JINR as well as the interlaboratory links between FLNR, DLNP, and FLNP with BLTP on topics, which are of common interest, to boost research results both experimentally and theoretically.

Condensed matter physics

The Scientific Council takes note of the status of obtaining a license to operate the IBR-2 facility and preparatory work to replace the air heat exchangers of the second cooling circuit of the reactor. Together with the PAC, the Scientific Council supports the FLNP’s plans and efforts to restart the operation of the IBR-2 facility in 2024–2025.

The Scientific Council supports the PAC’s recommendation to continue the activities on verifying the dynamics model of pulsed reactors, selecting the optimal configuration of the active core, and optimizing the design of the reactor vessel and reactivity modulator. The Scientific Council also welcomes the ongoing development of a list of R&Ds to create a full-scale model of the reactor reactivity modulator and appreciates the continuation of developing the concept of a system for fast changing the working substance in the chamber of the cryogenic moderator of the reactor. The Scientific Council agrees with the PAC that the development of the scientific programme of the NEPTUN reactor should be continued along with the ongoing activities within the large research infrastructure “Pulsed neutron source and the complex of spectrometers”.

The Scientific Council is satisfied with the status of the Fourier stress diffractometer FSD at beamline 11A of the IBR-2 reactor. The Scientific Council, relying on the opinion of the PAC, believes that the achievements of FLNP in the development of the correlation diffractometry method will be very useful for designing instruments at new long-pulse neutron sources and supports further development of this method.

The Scientific Council appreciates the attention paid by the PAC for Condensed Matter Physics to the procedures applied to assess projects at JINR. Sharing the PAC’s

opinion that the current procedures for the assessment of projects at JINR are appropriate, the Scientific Council recommends their application at future PAC meetings.

Reports by young scientists

The Scientific Council followed with interest the reports by young scientists, selected by the PACs for presentation at this session: “Development of technology for the production of double-sided silicon microstrip modules for upgrading the NICA BM@N Silicon Tracking System” by A. Sheremetiev (VBLHEP), “Enhanced directional extraction of very cold neutrons using a diamond nanoparticle powder reflector” by A. Nezvanov (FLNP), and “Origin of high-pressure phase transition in the $\text{Ln}_2\text{Ti}_2\text{O}_7$ (Ln = La, Nd, Pr) Carpy-Galy phases” by A. Asadov (FLNP). The Scientific Council thanks the speakers and welcomes such selected reports in the future.

VI. Amendments to the Regulation for the election of Directors and for the endorsement of appointment of Deputy Directors of JINR Laboratories

The Scientific Council endorses the new edition of the Regulation for the election of Directors and for the endorsement of appointment of Deputy Directors of JINR Laboratories, proposed by the JINR Directorate, and recommends its approval at the next CP session in March 2024 with the following amendments (Appendix 1):

- remove the requirement to obtain a two-thirds majority of the votes cast for a candidate running for a second term of office;
- a candidate for the position of a Laboratory Director is deemed elected if he/she received, in secret ballot, a simple majority of the votes cast by the members of the Scientific Council who took part in the voting;
- the SC would appreciate it if additional support for the candidate is provided in writing by an expert in the field.

VII. Awards and prizes

The Scientific Council approves the proposal of the JINR Director, G. Trubnikov, to award the title “Honorary Doctor of JINR” to Ch. Stoyanov (Bulgaria).

The Scientific Council approves the Jury’s recommendations presented by Vice-Director L. Kostov on awarding the JINR annual prizes for best papers in the fields of theoretical and experimental research, methodology and technology research, and applied technology research (Appendix 2).

VIII. Election and announcement of vacancies in the directorates of JINR Laboratories

The Scientific Council endorsed the appointment of A. Guskov as Deputy Director of the Dzhelepov Laboratory of Nuclear Problems (DLNP) until the completion of the term of service of the current DLNP Director, E. Yakushev.

The Scientific Council endorsed the appointment of B. Mukhametuly as Deputy Director of the Frank Laboratory of Neutron Physics (FLNP) until the completion of the term of service of the current FLNP Director, E. Lychagin.

The Scientific Council announces the vacancy of the position of Director of the Flerov Laboratory of Nuclear Reactions (FLNR). The election will take place at the 137th session of the Scientific Council in February 2025.

Due to the fact that the current VBLHEP Directorate is successfully operating at the final stage of constructing the NICA complex, it seems reasonable to give the VBLHEP team the opportunity to complete this stage with the existing staff and with the current distribution of responsibilities and management functions. In this regard, the Scientific Council agrees on the extension of the term of office of all Deputy Directors of VBLHEP until the election of the Director of VBLHEP.

IX. Next sessions of the Scientific Council

The 136th session of the Scientific Council will be held on 12–13 September 2024.

The 137th session of the Scientific Council will be held in February 2025, the exact date to be decided at the 136th session.



G. Trubnikov

Chair of the Scientific Council



S. Kilin

Co-chair of the Scientific Council



S. Nedelko

Secretary of the Scientific Council