

I. General considerations

The Scientific Council takes note of the comprehensive report by JINR Director V. Matveev, covering information about JINR's operation during the COVID-19 pandemic, the decisions of the latest session of the JINR Committee of Plenipotentiaries held by videoconference in June 2020, recent achievements in science and technology in the main areas of JINR activities as well as recent events in JINR's cooperation with its partner institutions and organizations.

The Scientific Council appreciates the efforts being taken by the JINR Directorate to ensure the stable operation of JINR under conditions of the COVID-19 pandemic and of health protection measures for the staff and visitors.

The Scientific Council notes that it meets for the first time remotely in the videoconference mode.

The Scientific Council recognizes recent achievements in implementing and developing JINR's major facilities, in particular:

- the progress achieved in constructing the NICA megascience complex which includes a unique technological accomplishment accompanied by obtaining the first scientific results. The Scientific Council commends the regular functioning of the Supervisory Board of the NICA Complex Project and its Cost and Schedule Review Committee. Several dedicated cooperation agreements have been recently signed by JINR with the Helmholtz Centre for Heavy Ion Research (GSI, Germany), with the Federal Ministry of Education and Research (BMBF, Germany), and with the Ministry of Science and Technology of the People's Republic of China;

- the full readiness of the DC-280 accelerator for the start of Day-1 experiment, including preparing the americium-243 target, obtaining a calcium-48 beam of high intensity, and performing a series of test experiments as well as launching a new cross-laboratory project of FLNR, LIT and BLTP entitled "Superheavy nuclei and atoms: limits of nuclear mass and boundaries of the Periodic Table" and supported by the Russian Ministry of Science and Higher Education within a grant competition for realizing large-scale research projects in the priority fields of scientific and technological development;

- the increasing effective volume of the Baikal-GVD detector, which reached 0.35 km³ after the installation of two new clusters in February–April 2020, and the continuous development of the entire Neutrino Programme of JINR with its new results obtained in the experiments with JINR's participation;

– the further development of the User Programme for the IBR-2 spectrometers and the efforts being taken by FLNP to meet the user needs by updating the IBR-2 working schedule, which was shifted due to the COVID-19 lockdown period;

– the progress in development of the Multifunctional Information and Computing Complex, including the recent integration, through the DIRAC Interware, of JINR’s major computing resources: Tier1 and Tier2 grid components, the “Govorun” supercomputer, the NICA cluster, the cluster of the National Autonomous University of Mexico, and JINR’s storage resources.

The Scientific Council welcomes the new initiatives in the cooperation format between JINR and BMBF, which will be focused on three key fields, each regulated by its steering committee: Heisenberg–Landau Programme, Neutron Research, and Young Scientists Programme. The Scientific Council also notes a series of events and meetings held within cooperation with Azerbaijan, France, Russia, Serbia, South Africa as well as with CERN.

The Scientific Council commends the efforts being taken by JINR Directorate to ensure the competitive level of remuneration for JINR’s highly qualified staff by establishing an Incentive Fund and developing the corresponding Regulations for its use.

The Scientific Council welcomes the preparation by the JINR Directorate of a plan of activities dedicated to the celebration of the 65th anniversary of JINR (26 March 2021) both at JINR and Member States in the course of the year 2021.

II. Recommendations in connection with the PACs

The Scientific Council takes note of the recommendations made by the PACs at their meetings in June–July 2020, as reported at this session by I. Tserruya, Chair of the PAC for Particle Physics, M. Lewitowicz, Chair of the PAC for Nuclear Physics, and D. L. Nagy, Chair of the PAC for Condensed Matter Physics. The Scientific Council requests the JINR Directorate to consider these recommendations while preparing the JINR Topical Plan of Research and International Cooperation for the year 2021.

Particle physics

The Scientific Council is pleased to note that despite the difficult pandemic situation, the Nuclotron-NICA project including the VBLHEP infrastructure developments advanced well and, basically, at the necessary pace. In particular, in spite of a two-month delay, the tests of the main Booster systems were completed and preparation

work for launching the Booster synchrotron is started. The Scientific Council seconds the concern of the PAC for Particle Physics with the lack of sufficient manpower for the collider magnet construction and tests and urges the JINR management to take the necessary steps to address this issue that otherwise could seriously impact the overall schedule of the NICA project. The Scientific Council endorses the PAC's request that the Nuclotron maximum energy of 4.5 GeV/n should be available as soon as possible.

The Scientific Council appreciates the efforts of the BM@N team on upgrading the detector for the heavy-ion physics runs planned for 2021 and beyond and on completion of the analysis of short-range correlations of nucleon pairs in inverse kinematic reactions measured at the Nuclotron.

The Scientific Council welcomes the steady progress in the assembly and production of most of the MPD detector components foreseen in the first-stage configuration as well as in the production of the Inner Tracking System. The Scientific Council shares the PAC's concern regarding the delay in the ECAL construction and the resulting impact on the physics programme, with only half of the coverage foreseen now at the first stage while the second half is expected at a later stage. The Scientific Council appreciates the ongoing Monte Carlo simulations of the detector and physics processes in preparation for the first beams in MPD and welcomes the plans to intensify this effort. The Scientific Council supports the PAC's recommendation on extension of the MPD project until the end of 2025 with first priority.

The Scientific Council encourages the JINR team in the COMPASS experiment to enhance its participation in the data analysis and develop collaborative work for the physics exploitation of the data in order to secure scientific recognition of the group's two-decade-long work in COMPASS. By the project completion in 2022, the group should explore new opportunities like e.g. MPD and SPD where its experience is certainly very much needed. The Scientific Council endorses the PAC's recommendation concerning extension of the COMPASS-II project until the end of 2022 with first priority.

The Scientific Council recognizes that the TAIGA project has a solid in-house component with significant international participation. The JINR group is playing an important role in the TAIGA collaboration for the design and production of the IACTs, but its participation in the data analysis should be strengthened. Publication of the methodological results obtained by the group should be carried out more actively. The Scientific Council shares the PAC's recommendation on extension of the TAIGA project until the end of 2023 with first priority.

The Scientific Council appreciates the high quality of the work performed by the JINR group in the Daya Bay and JUNO experiments. The contributions of the JINR group to both experiments made in many important systems of the detectors are acknowledged and imprinted in the structure of the collaboration management. The Scientific Council supports the plans of the JINR team in the data analysis of the Daya Bay experiment and in the development, construction and commissioning of the JUNO project. It endorses the PAC's recommendation to continue the participation in the JUNO project until the end of 2023 with first priority.

The Scientific Council, taking into account the visible role of the JINR group in the NOvA experiment and its solid plans for further advances in forefront neutrino physics research with the DUNE experiment, supports the PAC's recommendation on continuation of NOvA and approval of the group's participation in DUNE, both until 2023 with first priority. It supports the PAC's proposal to the JINR Directorate to provide the necessary resources to the DUNE project in order to guarantee visible participation of the JINR group and to encourage the group to play the role of bridgehead for the future joining of more groups associated with JINR.

Nuclear physics

The Scientific Council commends the progress of work on the Factory of Superheavy Elements (SHE Factory) reviewed by the PAC for Nuclear Physics. At present, the "flat-top" system at the DC-280 cyclotron has been tested, leading to further increase of the efficiency of production of heavy-ion beams. A differential pumping system is being constructed at the GFS-2 gas-filled separator to accept the highest possible ion current produced by DC-280. All previously scheduled test experiments have been completed. The first experiment to produce moscovium isotopes in the $^{48}\text{Ca}+^{243}\text{Am}$ reaction at the SHE Factory has been prepared. The americium target has been installed and tested. The beginning of the experiment is planned for the autumn of this year.

The Scientific Council supports the PAC's recommendations on the concluding theme "Improvement of the JINR Phasotron and Design of Cyclotrons for Fundamental and Applied Research". As a result of the upgrade of the Phasotron and its beam lines, a stable operation of the accelerator was ensured for an average of 1000 hours per year, of which about 80% was used for medical research. Research under the theme was focused mostly on developing and improving cyclotrons used in hadron therapy. The most important activities were carried out in collaboration with the Institute of

Nuclear Physics, Polish Academy of Sciences (Kraków, Poland) on the modernization of the conventional IAC-144 cyclotron and with the Institute of Plasma Physics of the Chinese Academy of Sciences (Hefei, PRC) on the design and manufacture of the SC200 superconducting isochronous cyclotron for proton therapy. A design of the SC230 compact superconducting cyclotron with smaller dimensions and the required magnetic field level was developed by the team.

The Scientific Council concurs with the PAC's recommendation that the DLNP Directorate consider continuing the studies planned by the team in the field of development, construction and upgrade of cyclotrons under one of the themes of this Laboratory. The Scientific Council recommends that the JINR Directorate make soon a decision on the Biomedical Research Centre with dedicated proton accelerator and JINR contribution to the future medical complex for proton therapy.

The Scientific Council notes the importance of the EG-5 accelerator for JINR and its Member States, which requires a modernization of the existing accelerator or a purchase of a new one with similar design parameters. In the opinion of the PAC, the most cost-effective solution is the modernization of this accelerator. The Scientific Council supports the PAC's recommendation on the preparation and opening of a project to modernize the existing accelerator and associated experimental infrastructure activities under the theme "Investigations of Neutron Nuclear Interactions and Properties of the Neutron" with financing from the budget of the current Seven-year plan for the development of JINR, starting in 2021.

The Scientific Council supports the recommendation on the opening of the new project "Measurement of ordinary muon capture for testing nuclear matrix elements of 2β decays (project MONUMENT)" for 2021–2023 with first priority. This project is aimed at carrying out experimental measurements of muon capture at several daughter candidates on 2β decay nuclei. Obtained results would have high importance for checking the accuracy of theoretical calculations of nuclear matrix elements. The measurements of muon capture will be carried out at the meson factory of the Paul Scherrer Institute (PSI) in Switzerland.

Condensed matter physics

The Scientific Council notes the results achieved in the technical design of the IBR-3 reactor to be a new neutron source of JINR as well as the beginning of JINR's cooperation with the potential fuel manufacturer. Presently, the technical requirements

for the next stage of designing the IBR-3 — development of the Technical Proposal — have been identified and the contract for this work is being prepared.

The Scientific Council welcomes the continuous efforts in experimental studying and modelling of the neutron background at the spectrometers of the IBR-2 reactor as well as in search for means of suppressing the backgrounds at its extracted beams. The Scientific Council supports the recommendation of the PAC for Condensed Matter Physics towards deeper elaboration of the IBR-3 technical proposal and continuation of the FLNP activities on studying and suppressing neutron background at the IBR-2 spectrometers.

The Scientific Council takes note of the recent developments regarding the joint facility for structural research using synchrotron X-rays at the SOLARIS National Synchrotron Radiation Centre and agrees with the PAC that these JINR–SOLARIS collaborative efforts in building the SOLCRYM laboratory will extend the range of condensed matter research approaches at JINR. The Scientific Council shares the PAC’s opinion that close attention should be paid to the design details of the SOLCRYM laboratory.

The Scientific Council supports the PAC’s recommendations on themes and projects previously approved for completion in 2020 as well as on new themes and projects. These recommendations concern:

- closure of the theme “Investigations of Condensed Matter by Modern Neutron Scattering Methods” and opening of a new theme “Investigations of Functional Materials and Nanosystems Using Neutron Scattering” for 2021–2025 with a new project “Development of inverse geometry inelastic neutron scattering spectrometer at the IBR-2 reactor” for 2021–2023;

- closure of the theme “Development of Experimental Facilities for Condensed Matter Investigations with Beams of the IBR-2 Facility” and opening of a new theme “Scientific and Methodological Research and Developments for Condensed Matter Investigations with IBR-2 Neutron Beams” for 2021–2025; closure of the BSD and PTH projects and opening of a new project of this theme “Construction of a wide-aperture backscattering detector (BSD) for the HRFD diffractometer” for 2021–2023;

- closure of the project “A system for neutron operando monitoring and diagnostics of materials and interfaces for electrochemical energy storage devices at the IBR-2 reactor”;

- extension of the theme “Modern Trends and Developments in Raman Microspectroscopy and Photoluminescence for Condensed Matter Studies” for

2021–2023; closure of the Nanobiophotonics project and opening of the Biophotonics project for 2021–2023;

– extension of the theme and project “Novel Semiconductor Detectors for Fundamental and Applied Research” for 2021–2023 and of the PAS project for 2021–2023;

– opening of the new project “Study of the radioprotective properties of the Damage Suppressor (Dsup) protein on a model organism *D. melanogaster* and human cell culture HEK293T” for 2021–2022 within the theme “Biomedical and Radiation-Genetic Studies Using Different Types of Ionizing Radiation”;

– extension of the theme and project “Research on the Biological Effect of Heavy Charged Particles with Different Energies” for 2021–2023.

The Scientific Council welcomes further continuation of activities within the theme “Methods, Algorithms and Software for Modeling Physical Systems, Mathematical Processing and Analysis of Experimental Data” which was positively reviewed by the PAC.

III. Endorsement of appointments of FLNR Deputy Directors

The Scientific Council endorsed the appointment of G. Kamiński and A. Yeregin as Deputy Directors of the Flerov Laboratory of Nuclear Reactions (FLNR), until the completion of the term of office of FLNR Director S. Sidorchuk.

IV. Awards and prizes

The Scientific Council approves the proposal by JINR Director V. Matveev to award the title “Honorary Doctor of JINR” to M. Spiro (France), I. Tserruya (Israel), and I. Wilhelm (Czech Republic), in recognition of their outstanding contributions to the advancement of science and the education of young scientists.

The Scientific Council approves the recommendation of the Jury presented by its member, V. Shvetsov, on the award of the V. Dzhelepov Prize to E. Shabalin (FLNP, JINR) for the development and construction of the world’s unique heterogeneous cryogenic neutron moderator at IBR-2.

V. Next session of the Scientific Council

The 129th session of the Scientific Council will be held on 18–19 February 2021.

The 130th session of the Scientific Council is planned to be held on 23–24 September 2021.



V. Matveev

Chair of the Scientific Council



C. Borcea

Co-Chair of the Scientific Council



A. Sorin

Secretary of the Scientific Council