

I. General considerations

The Scientific Council warmly thanks Victor Matveev for his outstanding contribution to the development and success of JINR during his mandate at the head of JINR and congratulates Grigory Trubnikov on his election as Director of JINR.

The Scientific Council takes note of the comprehensive report by the JINR Director Grigory Trubnikov, covering the decisions of the last session of the JINR Committee of Plenipotentiaries held in videoconference mode (November 2020), the selected results and achievements obtained in JINR, and the latest events in the development of international cooperation.

The Scientific Council is pleased to hear about the in-person and remote meetings and conferences in the Member States dedicated to the 65th anniversary of the JINR and considers such events to be useful instruments for raising the worldwide visibility of the Institute. The Scientific Council wishes to recognise the initiative welcomed by the Committee of Plenipotentiaries to declare 2021 the Year of Bulgaria in JINR.

The Scientific Council supports JINR's participation in the programme of events for 2021 declared as Year of Science and Technology in the Russian Federation and recommends that the JINR Directorate takes measures to widely advertise key achievements of JINR in the Russian mass media and beyond.

The Scientific Council welcomes the endorsement by the JINR Committee of Plenipotentiaries of the programme of JINR development presented by newly elected Director Grigory Trubnikov. The Scientific Council also fully endorses the JINR Long-Term Development Strategic Plan up to 2030 and Beyond.

The Scientific Council recognises the recent scientific results and technology achievements obtained within the development of the large-scale research infrastructures of JINR.

In particular, the Scientific Council strongly appreciates the recent success obtained during the commissioning of the Booster of the NICA complex illustrated by the first accelerated Booster beam. The Scientific Council also welcomes the progress in constructing the NICA collider systems and MPD, as well as the high-quality results of the scientific collaborations around NICA and the plans in this direction for 2021.

The Scientific Council is impressed by the result of the first experiment on synthesizing moscovium isotopes performed at the Factory of SuperHeavy Elements (SHE) and processing the first data taken with the new DGFRS-2 separator.

The potential of discovery opened by the new SHE Factory and its new equipment is clearly on its way. In the field of nuclei far from stability, the progress in the development of the DRIBs-III accelerator complex is acknowledged.

The Scientific Council appreciates the installation of two new clusters of the Baikal Neutrino Telescope, whose deep-water detector has reached an effective volume of 0.35 km³, thus making Baikal-GVD one of the three largest telescopes in terms of the effective area and volume and the largest in the Northern Hemisphere.

The Scientific Council notes the progress of implementation of the User Programme with the IBR-2 spectrometers remaining operational even under the pandemic conditions. The Scientific Council also supports the activity performed for developing the concept of the new neutron source for FLNP in JINR.

The Scientific Council is pleased with the contribution of the JINR Tier1 centre to the CMS experimental data processing in 2020, noting that, in terms of performance, the JINR Tier1 is ranked second among the world Tier1 centres for the CMS experiment. The Scientific Council also welcomes the publication of the scientific results achieved using the Govorun supercomputer resources.

The Scientific Council notes the extension of the applied research scope of JINR, in particular, in order to contribute to the COVID-19-related research made in cooperation with partner institutions.

The Scientific Council also welcomes the Committee of Plenipotentiaries' approval of the initiative to establish an interlaboratory innovation centre of JINR whose development programme should be further defined.

The Scientific Council highly appreciates the reported new steps in strengthening the cooperation with non-member states in proliferation of shared interests in research and technology, as well as in training and information exchange activities.

II. Progress of the NICA project

The Scientific Council takes note of the progress report concerning the NICA project presented by the Acting Vice-Director and VBLHEP Director, Vladimir Kekelidze, and recognises the recent impressive achievements in implementing and developing of the JINR major facilities despite the problems caused by the pandemic, in particular, the progress in the construction of the NICA complex, and first of all the successful launch of the superconducting booster synchrotron, which confirmed the high quality of all preparatory work.

The Scientific Council commends the efficiency of the regular meetings of the Cost and Schedule Review Committee of this project. The infrastructure development and production of collider elements are progressing at a good pace. The development of research collaborations on the two main experimental facilities (MPD and BM@N) continues. The third collaboration is being formed to prepare the SPD experiment. A very significant progress has been achieved in the construction of the MPD setup. The preparation for the autumn run of the BM@N experiment with heavy ion beams is going on.

The resources requested for the NICA project within the updates of the Seven-Year Plan for the Development of JINR for 2017–2023 are in line with the construction of the basic configuration of the Complex and the implementation of the planned scientific programme. The Scientific Council agrees that, if the proposed funding profile is met, the launch of the basic configuration of the Complex in 2022-2023 is realistic. At the same time, the Scientific Council admits possible shifts in the plans during 2021–2023 due to the pandemic that has been going on for about one year.

III. Experiments at the SHE Factory

The Scientific Council listened with great interest to the report of the FLNR Scientific Leader Academician Yuri Oganessian. The Scientific Council notes with satisfaction the successful implementation of the first experiments on the synthesis of element 115 (moscovium) in reaction $^{243}\text{Am} + ^{48}\text{Ca}$. The Scientific Council congratulates the laboratory team on the successful start of the work and recommends a high priority for the programme of experimental research at the SHE Factory over the short- and mid-term horizons.

IV. Programme of the JINR Centre of Radiobiology Research

The Scientific Council takes note of the report concerning the research programme in radiation biology presented by the LRB Director, Alexandr Bugay. The Scientific Council highly appreciates the scientific goals and strategy of the innovative research in radiation neuroscience and clinical radiobiology. The Scientific Council welcomes the extension of scientific cooperation between JINR Member States in socially relevant applied research directions. The Scientific Council recommends preparing a more precise project proposal with specific milestones to consider it at next meetings of the JINR PAC.

V. Proposals for updates to the Seven-Year Plan for the Development of JINR for 2017–2023

The Scientific Council took note of the report “Proposal for updates to the Seven-Year Plan for the Development of JINR for 2017–2023” presented by the Chief Scientific Secretary, Alexander Sorin. The Scientific Council highly appreciates the complex efforts taken by the JINR Directorate to define key performance indicators and analyse the execution of the current Seven-Year Plan.

The Scientific Council supports in general the directions proposed for updating the Seven-Year Plan for the Development of JINR concerning, in particular, the implementation of the NICA megascience project, the development of DRIBs-III accelerator complex, the elaboration of a new neutron source of JINR, JINR’s participation in the construction of the SOLCRYS Laboratory at the SOLARIS National Synchrotron Radiation Centre of the Jagiellonian University, the construction of the Baikal-GVD neutrino telescope, the performance of the advanced experiments with reactor neutrinos within the DANSS and GEMMA/vGeN projects, the development of the JINR Multifunctional Information and Computing Complex including the Govorun supercomputer.

The Scientific Council also supports the initiative of the JINR Directorate to establish an inter-laboratory international Innovation Centre for Nuclear Physics Research (Innovation Centre), its main task being the development of technologies and methods in the field of nuclear and radiation medicine, radiation materials science, and IT, as well as the advanced training of professionals from JINR Member States in the field of radiation biology and medical physics. The Scientific Council also welcomes the prospects for the development of technologies for radiation materials science and applied research with heavy ion beams for JINR Member States within the Innovation Centre programme. The Scientific Council takes note of the plans for developing a new DC-140 cyclotron for these purposes in 2021–2023.

VI. Recommendations in connection with the PACs

The Scientific Council takes note of the recommendations made by the PACs at their meetings in January 2021, as reported at this session by Itzhak Tserruya, Chair of the PAC for Particle Physics, Marek Lewitowicz, Chair of the PAC for Nuclear Physics, and Dénes Lajos 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 2022.

The Scientific Council acknowledges the measures being taken by the JINR Directorate to consolidate the JINR scientific programme on the main tasks of the current Seven-Year Plan. In particular, the Scientific Council welcomes the mandate given by the JINR Directorate to all three PACs to propose an approach for prioritisation of JINR projects, — which would allow concentrating financial, human and intellectual resources on major scientific ventures of high impact potential. Such strategic policy would contribute to the increase of the representativeness of JINR worldwide and allow JINR groups to assume visible roles in international collaborations.

The Scientific Council highly values the rather non-trivial and delicate work of the PACs on prioritisation of the projects within the JINR Topical Plan, as exemplified by the prioritisation presented in the field of neutrino physics by the joint work of Particle Physics and Nuclear Physics PACs. This process is extremely important for the implementation of the JINR Long-Term Development Strategic Plan up to 2030 and Beyond.

The Scientific Council welcomes the intention of the JINR Directorate to follow the priority recommendations of the PACs based on JINR impact while maintaining existing international obligations. The Scientific Council advises that the JINR Directorate is advised to act together with the leadership of the JINR laboratories towards applying the PACs' recommendations where possible for consolidation of the available intellectual and material resources.

Particle physics

Concerning the NICA project, the Scientific Council seconds the PAC for Particle Physics in congratulating the Booster team on the smooth and successful first beam circulation in the Booster, confirming the high quality of all the preoperational works. Despite problems caused by the pandemic, all areas of the VBLHEP infrastructure development are advancing at the necessary pace. The Scientific Council is pleased to note the progress achieved in constructing and commissioning the new compressor station of the cryogenic complex, in developing the beam transport channels with corresponding magnetic optics, in the serial production of the collider cryo-magnetic system, and other NICA elements. The Scientific Council supports the PAC's recommendation to extend the Nuclotron-NICA project until the end of 2023.

The Scientific Council congratulates the MPD team on reaching the important

milestones: the completion of the magnet yoke assembly, the delivery of the solenoidal magnet and the start of the installation of MPD elements at their places inside the MPD hall aiming at their commissioning in 2021–2022.

The Scientific Council appreciates the progress towards the realisation of the BM@N project, including preparation of detectors, simulations and development of data analysis methods for the forthcoming runs of the BM@N detector with ion beams in 2021. The Scientific Council congratulates the Collaboration on the first publication on short-range correlation results in Nature Physics.

The Scientific Council recognises the long-lasting collaboration between JINR and GSI as well as the large synergies between the NICA and FAIR research programmes. The experience obtained by the JINR physicists in the CBM experiment at FAIR is valuable for the MPD, SPD and BM@N experiments at NICA. The Council endorses the PAC's recommendation on the continuation of JINR's participation in the CBM project until the end of 2025.

The Scientific Council notes the large similarity between the muon systems of PANDA and of the JINR flagship SPD experiment and appreciates the strong cooperation between the FAIR and NICA research programmes. The Scientific Council endorses the PAC's recommendation on the participation of JINR in the PANDA project until the end of 2024. It also shares the PAC's concern about the high average age of the JINR team and the large fraction of participants with very low FTE contribution (0.3 or less). The Scientific Council concurs with the PAC's advice to adapt the team's commitments to the available resources.

The Scientific Council joins the PAC in thanking the SPD team for the preparation of a comprehensive Conceptual Design Report (CDR) of a universal 4π -detector for registration and identification of secondary particles at high luminosity.

The Scientific Council supports the PAC's suggestion to the NICA management to appoint an appropriate Detector Advisory Committee for a thorough review of the CDR and its subsequent evolution into a Technical Design Report (TDR). It also encourages the SPD team to pursue every effort to form an international collaboration, find adequate resources and attract students and young scientists.

Nuclear physics

The Scientific Council congratulates the FLNR team on the successful start of the SuperHeavy Element (SHE) Factory experimental programme. The first experiment was

aimed at the synthesis of isotopes of element 115 (moscovium, Mc) in the $^{48}\text{Ca} + ^{243}\text{Am}$ reaction, which was made possible thanks to the new selection and rejection capabilities of the new DGFRS-2 separator put into operation at the end of 2020. During the five-week experiment more than fifty decay events of ^{288}Mc and ^{289}Mc isotopes were obtained, — which nearly doubled the statistics on these isotopes collected in previous experiments using the U-400 accelerator complex during the period from 2003 to 2012.

The high background suppression was achieved in the focal plane of the DGFRS-2 separator, — which is of great importance for registering decay events of long lifetimes.

The next round of experiments at the SHE Factory will take advantage of the increased intensity of ^{48}Ca beams on targets (up to 3.0–5.0 μA), the construction of a new differential pumping system and the implementation of larger targets. The programme includes experiments for the synthesis of flerovium isotopes (Fl) via $^{242}\text{Pu} + ^{48}\text{Ca}$ reaction and the development of a high intensity ^{50}Ti beam to prepare experiments for the synthesis of elements 119 and 120. The Scientific Council supports the ongoing scientific programme at the SHE Factory and the proposed experiments for the synthesis of superheavy elements.

The first experiments at the ACCULINNA-2 fragment separator were carried out using the $^2\text{H} (^8\text{He}, ^3\text{He}) ^7\text{H}$ reaction to reach nuclear structure information on the extremely-neutron-rich nucleus ^7H , in which ground and excited states were clearly observed. In other reactions, excited states in exotic nuclei ^7He , ^9He , and ^{10}Li were investigated. The Scientific Council recognises the scientific interest of the research performed at ACCULINNA-2 fragment separator related to the study of properties of drip line, light exotic nuclei.

The Scientific Council supports the PAC's recommendation on opening in 2022 a project for modernisation of the EG-5 accelerator under the theme "Investigations of neutron nuclei interactions and properties of the neutron" for one year. Funding of the project for 2022 is to be provided within the budget allocated to FLNP according to the update of the Seven-Year Plan for the Development of JINR for 2017–2023 approved by the Committee of Plenipotentiaries on 23 November 2020.

Concerning the theme "Non-accelerator neutrino physics and astrophysics", the Scientific Council supports the PAC's recommendation to extend it until the end of 2024. The theme is devoted to studying rare phenomena associated with weak interactions by the methods of modern nuclear spectroscopy.

The Scientific Council supports the general direction of such topical development,

when participation in highly prestigious international projects provides an access to know-how for the development of home-based neutrino experiments at the two facilities located at Kalinin NPP and Lake Baikal.

The Scientific Council recognises the importance of the Baikal-GVD large-scale project and particularly notes the vital contribution of JINR to the construction of the deep-water detector of this facility.

The Scientific Council endorses the PAC recommendation on continuation of the scientific programme under the theme “Non-accelerator neutrino physics and astrophysics” with the highest priority.

Neutrino physics

The Scientific Council congratulates the PAC for Particle Physics and the PAC for Nuclear Physics for the careful evaluation, in the joint session of the two PACs, of the five neutrino projects under the theme “Non-accelerator neutrino physics and astrophysics”.

Following the guidelines outlined by the JINR Director Grigory Trubnikov, the evaluation aimed at classifying the various projects into three categories, using the scheme adopted in the previous joint session in January 2019, which is based primarily on the scientific merit of the project, and the performance, impact and visibility of the JINR group:

- Category A: excellent projects, to be fully funded with adequate resources and encouraged to continue and expand their impact;
- Category B: very good projects, but with some weaknesses, to be funded together with a strong recommendation on where improvements are needed;
- Category C: projects with relatively low performance and impact, not prioritised for funding.

To this purpose, the project leaders were requested to answer a short common questionnaire prepared by representatives of the two PACs. Each project was reviewed by one referee from the PAC for Particle Physics and one from the PAC for Nuclear Physics. The questionnaire itself, the answers to the questionnaire and the referees’ reports have been uploaded to the Indico webpage of the PACs’ joint session. The final evaluation of each project was made taking into account the opinions of the two relevant referees and the subsequent discussion of the project at the joint session of the two PACs.

The evaluation resulted in specific recommendations for each project, emphasising their strengths and weaknesses as outlined in the recommendations of the joint session. The projects were ranked as follows:

- Category A: DANSS, EDELWEISS-RICOCHET, GERDA (LEGEND);
- Category B: GEMMA, SuperNEMO.

Condensed matter physics

The Scientific Council appreciates the close attention paid by the PAC for Condensed Matter Physics to the development of the concept for a new neutron source at FLNP and supports further monitoring and review of the progress in this direction.

The Scientific Council shares the PAC recommendations on construction of the SOLCRYS laboratory at the SOLARIS National Synchrotron Radiation Centre. Together with the PAC the Scientific Council welcomes the progress in constructing the SOLCRYS laboratory and recommends paying closer attention to the construction schedule and design details of the laboratory. Meanwhile, the Scientific Council shares some PAC concerns on a slight delay in the planned schedule of the laboratory construction occurred in 2020 due to the COVID-19 pandemic. However, it concurs with the PAC that this delay appears to be manageable within the timeframe of the entire project.

The Scientific Council also welcomes regular meetings of the working group for the construction of the SOLCRYS laboratory as well as discussions on the basic elements of the facility under development.

The Scientific Council notes with satisfaction the results of the PAC assessment on the plans for the IBR-2 instrumentation development for 2021–2025. In particular, the Scientific Council welcomes the status of the DRV neutron diffractometer (real-time diffraction) and a new small-angle neutron scattering and imaging options, which will meet the high demands of the user community for small-angle scattering experiments.

The Scientific Council agrees with the PAC that the development of the new inelastic neutron scattering spectrometer in inverse geometry is essential for extending the capacities of experiments in studying the dynamics and vibrational properties of condensed matter. The Scientific Council concurs with the PAC that the activities focused on the development and modernization of other instruments are important for providing competitive research opportunities compared to other leading neutron centres, as well as for the successful realization of the FLNP User Programme and the extension of the research scope of the IBR-2 facility. Following the PAC, the Scientific Council supports

the further modernisation of IBR-2 instruments and the suggested measures for improving their performance.

The Scientific Council is pleased with the statistics of the FLNP User Programme at the IBR-2 spectrometers and the implementation of the new Web-based application intended for collecting and evaluating research proposals. Together with the PAC, the Scientific Council notes that the IBR-2 facility has been operating according to the User Programme even in the pandemic period. The Scientific Council supports further development of the FLNP User Programme and recommends its extension.

The Scientific Council encourages the PAC to perform the ranked assessment of all the JINR research themes and projects within the competence of the PAC for Condensed Matter Physics based on their scientific merit and performance of the JINR group involved.

VII. Membership of the PACs

Following the proposal of the JINR Directorate presented by JINR Director Grigory Trubnikov, the Scientific Council appoints Wojciech Dominik (Institute of Experimental Physics, Warsaw University, Poland) and Alexandre Ivanov (Institut Laue-Langevin, Grenoble, France) as new members of the PACs for Particle Physics and for Condensed Matter Physics respectively, for a term of three years.

The Scientific Council thanks Jan Pluta and Joachim Mnich for their dedicated work in the PAC for Particle Physics.

VIII. Scientific reports

The Scientific Council thanks Academician Pavel Logatchov for his scientific report “Implementation of the SKIF project at the Budker Institute of Nuclear Physics (Novosibirsk)”.

The Scientific Council thanks Professor Richard Hoover for his excellent presentation “The recent SEM and ENAA investigations of carbonaceous meteorites in collaboration with JINR and PIN (RAS) and their potential relevance to Astrobiology and the origin and distribution of Biospheres”.

IX. Awards and prizes

The Scientific Council approves the proposal of JINR Director Grigory Trubnikov to award the title “Honorary Doctor of JINR” to Professor Luisa Cifarelli, Professor Michael

Waligórski, and Professor Stanislav Dubnička, in recognition of their outstanding contribution to the advancement of science and education of young scientists.

The Scientific Council approves the Jury's recommendations presented by the JINR Acting Vice-Director Vladimir Kekelidze on the award of JINR annual prizes for the best papers in the fields of scientific research, methodology, research and technology, and applied research (Appendix).

The Scientific Council approves the recommendations of the Jury presented by JINR Director Grigory Trubnikov and by the Jury Chair Alexander Olshevskiy of awarding the Bruno Pontecorvo prize for 2020 to Professor Niwa Kimio (Nagoya University, Japan) for the development of the high-resolution nuclear emulsion technique, which led to identification of the tau neutrino and direct observation of tau neutrino oscillations.

X. Naming of the Laboratory of Information Technologies

The Scientific Council supports the proposal of the JINR Directorate presented by JINR Director Grigory Trubnikov and LIT Director Vladimir Korenkov for naming the Laboratory of Information Technologies after Academician Mikhail Meshcheryakov.

XI. Announcement of new elections of Director of VBLHEP

The Scientific Council announces a vacancy for the position of Director of VBLHEP. The elections will be held at the 131st session of the Scientific Council in February 2022.

XII. Next session of the Scientific Council

The 130th session of the Scientific Council is scheduled for 23–24 September 2021.

The 131st session of the Scientific Council is scheduled for 24–25 February 2022.



Grigory Trubnikov

Chair of the Scientific Council



Catalin Borcea

Co-Chair of the Scientific Council



Alexander Sorin

Secretary of the Scientific Council