I. General considerations

The Scientific Council thanks Catalin Borcea, on the completion of his tenure as Co-Chair of the Scientific Council, for his impeccable work as Co-Chair of the Scientific Council, his tactful moderation of debates and his meticulous attention to every opinion. His work has made a significant contribution to the effectiveness of the Council as a whole.

Having considered the JINR Director's proposal, the Scientific Council elects Sergei Kilin Co-Chair of the Scientific Council for the period of three years starting from this session.

The Scientific Council takes note of the comprehensive report by JINR Director G. Trubnikov. The Scientific Council appreciates the progress in the implementation of the Seven-Year Plan, especially as to the flagship projects. The Scientific Council acknowledges the increased activity and outcomes of the international cooperation development made by the Institute through this year. The Council supports JINR's development as an international intergovernmental research organisation and the extension of its partnership.

II. Recommendations regarding the PACs

The Scientific Council takes note of the recommendations made by the PACs at their meetings in June 2021, 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.

All three PACs followed the new evaluation scheme as proposed by the JINR Directorate aiming at classifying projects into three categories (A, B and C) primarily based on their scientific merit, and the performance, impact and visibility of JINR groups.

Following the directive of the JINR Directorate, the projects were approved till the end of the current Seven-Year Plan (end of 2023), with the understanding that for those projects that will be included in the next Seven-Year Plan the approval will automatically be extended till the end of the requested period.

Particle physics

The Scientific Council acknowledges the progress in realization of the NICA project, in particular, in commissioning of power substations, preparations of the central cryogenic plant, installation of equipment in the new compressor building, and commissioning of the main new buildings. The Scientific Council welcomes the completion of the installation of the beam transport channel from the Booster to the Nuclotron and the plans for the second Booster run in 2021. The Scientific Council congratulates the accelerator team on the commissioning the Booster–Nuclotron channel and on the successful transfer of the beam of iron ions from the Booster to the Nuclotron through this channel. The growth of the MPD collaboration and the preparation of the MPD detector for the first physics measurements at the start of NICA operations are also appreciated.

The Scientific Council seconds the PAC's recommendation to approve JINR's participation in the T2K-II phase II experiment till the end of 2023 with ranking B and with a progress report in one year. The Scientific Council concurs that a possible JINR's participation in the future large-scale Hyper-Kamiokande experiment should be decoupled from the one in T2K-II, which should be taken into account by the JINR management when defining the next JINR Seven-Year Plan.

The Scientific Council recognizes the importance of JINR's obligations in the upgrade of the CMS detector and endorses the PAC's recommendation to approve the JINR's participation in the second phase of the CMS detector upgrade till the end of 2023 with ranking A.

The Scientific Council shares the PAC's concern about the lack of sufficient manpower for the data analysis and simulations in the BM@N experiment. The Council acknowledges the high importance of the BM@N detector successful operation in the first run of the accelerator complex including the Booster. The Council supports the PAC's recommendation for continuation of the BM@N project till the end of 2023 with ranking A.

The Scientific Council recognizes the important role of the JINR group in the development and construction of the main subdetector systems of the COMET set-up, together with JINR's visible participation in the research coordination and management of the international collaboration. The Council endorses the PAC's recommendation for continuation of the project until the end of 2023 with ranking A and with a progress report in one year.

The Scientific Council appreciates the significant contribution of the JINR team to the design, construction, operation and maintenance of the NA62 spectrometer, as well as the results of the 2016–2018 datasets analysis that led to the observation of twenty candidate events of the rare kaon decay $K^+ \to \pi^+ \nu\nu$. The Council supports the PAC's recommendation to approve JINR's participation in the NA62 experiment till the end of 2023 with ranking B.

The Scientific Council congratulates the ALPOM-2 team for having successfully finalized the data analysis and for publishing the results of the analysing power measurements which are of particular relevance to the JLab experiments. The group's plan to pursue this experiment will secure JINR's leadership in polarimetry equipment and study, though allocation of the requested polarized beam time in 2022-2023 might be difficult. The Council supports the PAC's recommendation for continuation of the ALPOM-2 experiment till the end of 2023 with ranking A.

The Scientific Council notes that JINR has been participating in the STAR experiment since its inception and has contributed to the construction and maintenance of the detector, to the software development and data analysis. The Scientific Council notes that the limited impact and visibility of the JINR team over the past three years is disproportionate with the group of thirty-three members (FTE 21). Noting also that the experience gained by the team is relevant to the NICA project and that the STAR experiment is expected to complete its data -taking phase within several years, the Scientific Council concurs with the PAC that the team should gradually shift its focus to the NICA experiment. The Council endorses the PAC's recommendation for continuation of JINR's participation in the STAR experiment till the end of 2023 with ranking B.

The Scientific Council supports the JINR team's plan to upgrade the proton polarimeter of the DSS experiment for measurements with polarized deuterons and protons at the Nuclotron and endorses the PAC's recommendation for continuation of the DSS experiment till the end of 2023 with ranking B.

The Scientific Council supports the JINR group's plans to participate in the HADES upgrade programme and in the physics analysis of p+p data. The Council notes the relatively small size of the JINR team, the relevance of HADES and CBM to the MPD and BM@N physics programme and a possible synergy between these experiments. The Scientific Council seconds the PAC's support for the plans of merging the JINR groups participating in HADES and CBM into one focusing on the research programme of the CBM

experiment as well as the recommendation for continuation of JINR's participation in the HADES experiment till the end of 2023 with ranking B.

The Scientific Council notes the new results obtained from the energy scan programme of the NA61 experiment and the involvement of the JINR group in the upgrade of the NA61 set up. The Council recognizes the relevance of NA61 to the NICA project and a possible benefit of having young researchers trained in the framework of the NA61 experiment for the NICA project, so the Council supports the PAC's recommendation for continuation of JINR's participation in the NA61 experiment till the end of 2023 with ranking B.

The Scientific Council appreciates the progress in the realization of the project "Precision laser metrology for accelerators and detector complexes". The use of Precision Laser Inclinometer (PLI) is growing: four PLIs have been installed in the LHC tunnel and two more PLIs are already used for the VIRGO detector. The Scientific Council supports the group involvement in the registration of the angular microseismic tilts of the earth's surface for the NICA, LHC and FCC colliders, as well as the use of compact PLIs for the "Einstein Telescope" project. The Council endorses the PAC's recommendation for continuation of the project till the end of 2023 with ranking A.

The Scientific Council notes with satisfaction the important scientific results obtained by the JINR teams participating in the ALICE, ATLAS and CMS experiments at LHC.

Nuclear physics

The Scientific Council notes that the start of experiments at the Super Heavy Element (SHE) Factory at FLNR, the key element of which is the DC-280 cyclotron, was an important event for JINR. The Scientific Council also notes that the commissioning of the SHE Factory, the upgrade of the U-400M cyclotron, as well as the creation of new-generation experimental setups for operation at the FLNR accelerators scale up JINR's capacities for carrying out fundamental nuclear physics and applied research to the highest level in wide collaboration with scientific centres of the JINR Member States and other countries interested in conducting research in Dubna.

The Scientific Council particularly highlights the results of the first experiments at the SHE Factory in production of Fl (flerovium) and Mc (moscovium) isotopes in fusion reactions ^{48}Ca + ^{242}Pu and ^{48}Ca + ^{243}Am, respectively, and supports the programme for a detailed study of radioactive properties of isotopes from Lr to Mc in 2022–2023. The Scientific Council also supports the continuation of the experiments with α-, β- and γ-

spectroscopy of isotopes of transfermium elements using the SHELS and DGFRS-II separators, which are to obtain data about their nuclear levels. The study of chemical properties of the new elements and relativistic effects associated with them is another purpose of the experiments carried out at FLNR, for which a new gas-filled separator DGFRS-III has already been installed in the experiment hall of DC-280.

The experiments studying mass-energy distribution of composite systems with Z from 114 to 120 formed in reactions with ^{52,54}Cr, ^{48}Ti, ^{86}Kr, and ^{68}Zn beams make it possible to assess the contribution of quasi-fission to the capture cross sections. Carrying out such experiments is extremely important for the synthesis of new superheavy elements with Z=119 and Z=120.

The further development of the FLNR accelerator complex and research setups includes modernizing and developing the FLNR cyclotron complex and creating new physics facilities. The main stages of the theme are aimed at increasing the stability of accelerators, increasing the intensity and improving the quality of the ion beams of both stable and radioactive nuclides in the energy range from 5 to 60 MeV/nucleon, while reducing their energy consumption. The main purpose of the work within the theme is to significantly increase the efficiency of experiments for synthesizing superheavy elements and studying their properties, as well as for producing light nuclei at the drip lines.

The Scientific Council endorses the PAC's recommendations for extending the themes “Synthesis and properties of superheavy elements, the structure of nuclei at the limits of nucleon stability” and “Development of the FLNR accelerator complex and experimental setups (DRIBs-III)” for 2022–2023 with first priority.

The Scientific Council endorses the PAC's recommendation for launching “Investigation of prompt fission neutron emission in fission” (ENGRIN) in 2022 as B-ranked project for one-year period and considering its possible further extension.

The Scientific Council endorses the PAC's recommendation for extending the B-ranked project “Study of deep subcritical electronuclear systems and possibilities of their application for energy production, transmutation of radioactive waste and research in the field of radiation material science (E&T&RM)” through the end of 2023.

Condensed matter physics

The Scientific Council notes with satisfaction the extraordinary meeting of the PAC for Condensed Matter Physics held on 29 April 2021 and aimed at prioritization of JINR projects into three categories using the scheme based primarily on the scientific merit of the project, project performance, as well as impact and visibility of the JINR group.

The Scientific Council thanks the PAC for continuing this activity at its regular 54th meeting held on 28 June 2021 and for completing the priority list of the JINR projects in Condensed Matter Physics following their detailed reviewing. The Scientific Council supports the ranking of the considered projects assigned in the PAC recommendations of 29 April and 28 June 2021.

The Scientific Council welcomes the on-going progress of the new neutron source of JINR – Neptune. In particular, the Scientific Council notes that, following the previous PAC recommendations, FLNP has updated the roadmap for the development of the new neutron source for approval of the JINR management and Rosatom State Atomic Energy Corporation. The approval of the roadmap will enable R&D activities of developing fuel elements with neptunium-nitride-based fuel and of preparing technical specifications for a conceptual design of the Neptune reactor. The Scientific Council agrees with the PAC that a detailed report on the R&D activities of developing fuel elements and preparing a conceptual design of the Neptune reactor should be presented at the next PAC meeting. The Scientific Council also shares the expectation of the PAC to hear a report on principal points of the design of cold moderators, primary neutron optics and shielding as an integral part of the neutron source.

Together with the PAC, the Scientific Council supports further development of the small-angle neutron scattering method at the pulsed neutron source of JINR. In particular, the Scientific Council recommends continuing the upgrade of the YuMO diffractometer and welcomes the PAC's intention to consider its detailed upgrade programme at the next meeting.

The Scientific Council agrees with the PAC's recommendations for extending the theme "Radiation Physics, Radiochemistry, and Nanotechnology Investigations Using Beams of Accelerated Heavy Ions" for 2022–2023.

The Scientific Council welcomes the PAC's suggestion to additionally discuss the approach for assigning reviewers to projects at the next meeting of the PAC.

The Scientific Council thanks the PAC for holding the young scientists' poster session in videoconference format and suggests that the other PACs should have this practice.

III. Four pillars of BLTP

The Scientific Council thanks BLTP Director D. Kazakov for the report on the work of the Bogoliubov Laboratory of Theoretical Physics. The report details the success in all the main areas of research carried out at BLTP: high-energy physics, nuclear physics, theory of condensed matter, mathematical physics, as well as in scientific-organizational and scientific-educational work.

The Scientific Council recognizes the high level of the achieved scientific results most of which are world-leading. The Council recognizes that BLTP is on the top of the world scientific agenda in many areas. The cooperation of BLTP with other JINR research laboratories remains extremely important, within the flagship projects in particular.

The Scientific Council supports BLTP's activity in organizing scientific conferences and schools for young scientists, maintaining BLTP's status as one of the world's leading centres of theoretical physics. The personnel capacity of BLTP keeps growing as BLTP attracts not only the young, but also a number of outstanding scientists who make a strong addition to the scientific team of the laboratory.

IV. Progress of implementation of the NICA project

The Scientific Council takes note of the progress report on the NICA project presented by VBLHEP Director R. Lednický and of the achievements in implementation of the project, despite the problems caused by the pandemic. In particular, the Scientific Council acknowledges the progress in creating the beam extraction and transport channel for heavy ions accelerated in the superconducting booster synchrotron to the Nuclotron. The Scientific Council congratulates the staff of the VBLHEP Accelerator Department on the successful results of the channel test proving the high quality of the preparatory work. The Scientific Council appreciates the success in the infrastructure development and a good pace in the production of collider elements. The cooperation on the two main experimental facilities (MPD and BM@N) is being strengthened. There have been formed a collaboration and corresponding Detector Advisory Committee to prepare the third big facility (SPD). A significant progress has been reached in creating the MPD set-up: the superconducting solenoid magnet has been integrated with its yoke. The preparing activities for the autumn run of the BM@N experiment within the physical programme for short-range correlations and for the spring run with heavy ion beams scheduled for 2022 do continue. The Scientific Council leaves open the possibility of shifts in the NICA project implementation schedule forced by the longsome pandemic.

V. First steps in implementation of the JINR Long-Term Development Strategic Plan

The Scientific Council followed with interest the report of JINR Director G. Trubnikov presented by S. Nedelko on the implementation of the JINR long-term strategy.

The Council takes a positive note that, following the Long-Term Development Strategic Plan, JINR gets intensively acting for developing innovations: the Institute proceeded to create the International and Interlaboratory Innovation Centre and it got started NICA Applied Research and Innovation Committee, as well as the Working Group for Strategy Issues established by the decision of the Committee of Plenipotentiaries. There has also been launched a new web-resource for monitoring strategy implementation. The Directorate pays due attention to improving the performance of the Topical Plan realization and administrative management. The development of the new set-ups and modernisation of the existing set-ups are being well executed.

The Scientific Council expects that a concept of the long-term development strategic plan for 2024–2030 will be presented at the next session.

VI. Reports by young scientists recommended by the PACs

The Scientific Council appreciates the report “Effect of charged lipids on β-amyloid peptide interactions with a phospholipid membrane” made by D. Badreeva and selected by the PAC for Condensed Matter Physics for presentation at this session. The Scientific Council emphasizes that young scientists’ reports are most welcome.

VII. Awards and prizes

The Scientific Council congratulates Professor Kimio Niwa (Nagoya University, Japan) on winning the B. Pontecorvo prize for 2020. The Council highly appreciates Professor Niwa’s report prepared for this session and presented by A. Olshevsky.

The Scientific Council approves the proposal of the JINR Directorate for awarding the title of Honorary Doctor of JINR to Professor M. Kovalchuk, President of the National Research Centre “Kurchatov Institute”.

The Scientific Council congratulates the winners of the JINR annual prizes for the best papers in the fields of scientific research, methodology, research and technology, and applied research.

VIII. Announcement of new elections

The Scientific Council announces that the election for the position of Director of the Bogoliubov Laboratory of Theoretical Physics will be held at the 132nd session of the Scientific Council in September 2022.

IX. Next sessions of the Scientific Council

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

The 132nd session of the Scientific Council is provisionally scheduled for 29–30 September 2022.

G. Trubnikov
Chair of the Scientific Council

S. Kilin
Co-Chair of the Scientific Council

S. Nedelko
Secretary of the Scientific Council