

I. General considerations

The Scientific Council takes note of the comprehensive report by JINR Director V. Matveev, covering the priorities of the JINR development within the current seven-year period (2017–2023), the main goals of the JINR research programme, the decisions of the recent session of the JINR Committee of Plenipotentiaries (March 2018), and events in JINR's international cooperation.

The Scientific Council recognizes the efforts being taken by the JINR Directorate towards achieving the priority goals of scientific research in the fields of particle physics, nuclear physics, condensed matter physics, and radiation biology. The Scientific Council emphasizes the importance of consolidating the scope of in-house experiments and of experiments within the framework of international partnership programmes with essential contribution being made by the JINR staff.

The Scientific Council approves the adopted order of priorities in the development of JINR facilities to provide JINR with the necessary basis for maintaining its unique position among the leading physics research centres and for further integrating JINR into the European and global research programmes. The Scientific Council appreciates that the NICA complex and the Factory of Superheavy Elements (SHE Factory) have been included in the ESFRI roadmap and in the NuPECC long-range plan, and that IBR-2 has become a part of the European neutron roadmap. The neutrino research projects at the Kalinin NPP and at Lake Baikal, other JINR's flagship programmes, should also be integrated into the global research infrastructure. Every effort should be made to insert JINR as an element of the European Strategy of Particle Physics in partnership with CERN.

The Scientific Council welcomes the JINR Directorate's work to develop the Institute's engineering infrastructure as well as the measures being taken to support the educational activity and to implement the human resources and social policy, considering these activities to be vitally important for achieving JINR's strategic goals.

The Scientific Council welcomes JINR's increasing international cooperation, in particular, strengthening ties with European partners, establishing new partnerships with China, and expanding cooperation horizons in Latin America and Africa. The Scientific Council also notes with satisfaction the training programme "JINR Expertise for Member

States and Partner Countries” and the cooperation with research and educational organizations of Israel.

The Scientific Council expects active participation of JINR and its partners in events to be held within the International Year of the Periodic Table of Chemical Elements in 2019.

II. Implementation of the Seven-year plan for the development of JINR for 2017–2023

The Scientific Council notes with high appreciation the reports concerning progress in implementing the Seven-year plan for the development of JINR (2017–2023) in its major sections, presented by JINR Vice-Director R. Lednický (particle physics and information technology), by JINR Vice-Director and VBLHEP Director V. Kekelidze (NICA project), by JINR Vice-Director M. Itkis (nuclear physics), by JINR Vice-Director B. Sharkov (condensed matter physics and radiation biology), by JINR Chief Engineer B. Gikal (development of the engineering infrastructure), and by UC Director S. Pakuliak (education).

On the whole, the Scientific Council highly appreciates the ongoing efforts to implement the Seven-year plan. However, considering the increasing number of new scientific themes and projects reported, the Scientific Council stresses that JINR needs to consolidate its research programme within the major objectives of the Seven-year development plan.

At its future sessions, the Scientific Council expects to be informed about further progress in implementing the Seven-year plan, especially with respect to the NICA and SHE Factory projects.

III. Recommendations in connection with the PACs

The Scientific Council takes note of the recommendations made by the PACs at their meetings in June 2018, as reported at this session by I. Tserruya, Chairman of the PAC for Particle Physics, M. Lewitowicz, Chairman of the PAC for Nuclear Physics, and D. L. Nagy, Chairman 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 2019.

Particle physics issues

The Scientific Council appreciates the progress towards realization of the Nuclotron-NICA project, noting the successful operation of the KRION-6T heavy-ion

source and significant improvements in the quality of the beam structure, while encouraging the accelerator team to further improve the emittance of the extracted beam. The Scientific Council acknowledges the progress achieved in the civil construction of the NICA collider complex, the efforts of the VBLHEP and JINR managements towards its timely completion and welcomes the continuous progress in various other areas of this flagship project.

The Scientific Council congratulates the NICA management for organizing the First Collaboration Meeting of the MPD and BM@N experiments, which took place at JINR on 11–13 April 2018, considering it to be a significant milestone in the realization of these experiments and in opening the NICA project to international collaboration. The Scientific Council notes with satisfaction the great interest of the international scientific community in the MPD and BM@N experiments, as reflected by the attendance of some 200 participants at the meeting and by the large number of new groups that are joining the Collaborations. The Scientific Council endorses the clear road map developed at this meeting for the establishment of the structure and management teams of the MPD and BM@N Collaborations and supports the management's efforts to secure funding for NICA collaborators.

The Scientific Council appreciates the ongoing collaborative efforts to prepare the technical design reports for the MPD subsystems. The Scientific Council urges the MPD team to finalize the ECAL TDR, including results of simulation for the recently adopted projective geometry, and to develop a detailed scenario for the timely construction and commissioning of ECAL as soon as possible.

The Scientific Council appreciates the successful commissioning of the large-area GEM detectors and of the first silicon stations of the vertex detector of the BM@N set-up. The Scientific Council seconds the recommendations of the PAC for Particle Physics, encouraging the team to concentrate on the analysis of the large sample of experimental data collected in the recent Nuclotron run with argon and krypton beams and on the completion of the detector configuration, including the installation of a vacuum pipe through the experimental set-up. It also congratulates the Collaboration for the prompt completion of the first measurements of short-range correlations in carbon nuclei using reverse kinematics in the BM@N set-up, and looks forward to the completion of the physical analysis of these results.

The Scientific Council supports the PAC's recommendations on the approval of new projects and on the continuation of ongoing projects in particle physics within the suggested time scales, as outlined in the PAC's recommendations. In particular,

continuation of the HyperNIS, ALPOM-2 and DSS projects, as well as JINR's participation in the NA62 and STAR experiments are approved until the end of 2021 with first priority.

The Scientific Council endorses the PAC's recommendations for the continuation of JINR's participation in the NA61 and HADES experiments until the end of 2021 with second priority. In particular, the Scientific Council supports the PAC's suggestion to reduce the NA61 travel budget since there will be no run in 2019 and 2020, and the suggestion to the JINR HADES team to shift its focus to the performance of similar dilepton measurements at NICA.

The Scientific Council recognizes with appreciation the important results achieved by the JINR group in collaboration with CERN within the project "Precision laser metrology for accelerators and detector complexes". The Scientific Council considers together with the PAC that the group should implement its expertise in the NICA project and supports the recommendation on the continuation of this project until the end of 2021 with second priority.

The Scientific Council supports the PAC's recommendation to approve the new project entitled "ARIEL: Physics at future e^+e^- colliders" until the end of 2021 with third priority. Although theoretical calculations performed within the project could be useful for a future electron-positron collider, the Scientific Council shares the PAC's concern about the harsh international competition in the area of the proposed studies and other uncertainties which could affect the expected impact of this research.

Nuclear physics issues

The Scientific Council is pleased to note that the autonomous tuning work for the DC-280 cyclotron, which is the central part of the SHE Factory, is approaching its final phase. The commissioning of DC-280 and first test experiments are being planned at the end of 2018. In addition to constructing the experimental set-ups, a great deal of effort is also focused on licensing which must be completed prior to the first experiments.

The Scientific Council recommends that the JINR and FLNR Directorates put all necessary efforts to allow for the timely completion of the construction, licensing, and commissioning of the SHE Factory in 2018. The FLNR Directorate is recommended to provide thorough monitoring during the commissioning of the main systems and set-ups of the SHE Factory in order to guarantee reliable performance of the facility within the design parameters, and to focus on the preparation of Day-1 experiments.

The Scientific Council endorses the first experiment using the ACCULINNA-2 fragment separator, aimed at studying the properties of ^7H in the $^8\text{He}(d, ^3\text{He})^7\text{H}$ reaction and recommends the allocation of the requested beam time at the U-400M accelerator.

The Scientific Council appreciates the scientific goals and the current progress with the MAVR analyser, recommends completing the integration of all its mechanical and electrical systems and suggests performing the in-beam commissioning experiment as soon as possible in order to verify whether the projected performance is achieved.

The Scientific Council is concerned about the slow progress in the development of the new SC202 cyclotrons and recommends that closer collaboration be established with the Institute of Plasma Physics of the Chinese Academy of Sciences in Hefei. The Scientific Council supports the recommendation of the PAC for Nuclear Physics for extending the theme “Improvement of the JINR Phasotron and Design of Cyclotrons for Fundamental and Applied Research” until the end of 2019, noting however the lack of fundamental research aspects of this theme. The Scientific Council expects the new design to be fully completed by the next year and a detailed schedule of the construction of the SC202 compact cyclotron to be submitted to the PAC for consideration.

Neutrino physics issues

At its previous session, the Scientific Council reiterated its recommendation that all ongoing and planned neutrino experiments should be presented and discussed within a joint meeting of the PACs for Particle Physics and for Nuclear Physics, leading to a better coordination of the neutrino physics programme and therefore allowing implementation of priorities in a more concerted and efficient manner. In view of this, the Scientific Council welcomes the decision taken by these PACs to hold a joint session on neutrino physics and dark matter research on 22 January 2019. The agenda and the modalities of the evaluation of the presented projects will be prepared by the Chairmen of the two PACs in close collaboration with the JINR Directorate, by September-October 2018.

Condensed matter physics issues

The Scientific Council takes note with interest of an alternative option for the development of a new source of neutrons at JINR, submitted to the PAC for Condensed Matter Physics. The Scientific Council recommends that the suggested physical scheme based on a subcritical booster with a plutonium dioxide core and a non-multiplying tungsten target be thoroughly considered while elaborating the general concept of a new neutron source. The Scientific Council welcomes the initiation of a discussion

concerning the relevant scientific programme for a new source and, in particular, the development of a scientific rationale for the use of the moderators of ultracold and very cold neutrons at this facility. The Scientific Council expresses its intention to continue, together with this PAC, to follow up on the development of the general concept of a new neutron source and its scientific programme.

The Scientific Council takes note of the activities of the team coordinated by the FLNP Directorate concerning the development of the concept of a new laboratory for structural research of macromolecules and new materials at the National Synchrotron Radiation Centre SOLARIS of the Jagiellonian University in Kraków (Poland). The Scientific Council agrees that such a laboratory would contribute to extending the JINR research tools, which is of considerable importance in terms of complementarity between existing neutron-based techniques and future X-ray methods. At the same time the Scientific Council concurs with the PAC's recommendation to continue the analysis of the feasibility of the technical design and parameters required by future experiments in such a laboratory.

The Scientific Council supports the PAC's recommendations on the reviewed themes and projects. In particular, the Scientific Council welcomes the successful completion of the project "Isotope identifying reflectometry at the IBR-2 reactor", which resulted in implementing a principally new method to study diffuse processes in layered nanostructures at the IBR-2 facility, and concurs with the closure of this completed project.

The Scientific Council expects that the revised proposal of the project "Development of a facility for measurements with test electron beams at DLNP. LINAC-200" be reconsidered, assuming that the authors of the project will elaborate a detailed scientific proposal within the scope of the PAC for Condensed Matter Physics or, alternatively, will submit this proposal to another PAC.

Appreciating the recent achievements within the concluding theme "Theory of Condensed Matter", the Scientific Council agrees that a new theme "Theory of Complex Systems and Advanced Materials" be opened for the period 2019–2023. The Scientific Council especially appreciates the opportunity to achieve closer correlation between the ongoing theoretical studies and experimental programmes at the JINR.

Other issues

With regard to the considered conceptual project of a research centre for proton therapy at JINR, the Scientific Council recognizes the importance of further development of instruments and methods for proton therapy at JINR and supports the

idea of assuming a leading role in disseminating the culture of proton therapy in JINR Member States. Considering the discussed ongoing work on the construction, together with the Chinese colleagues, of the SC202 therapeutic cyclotron, and the current state of the Phasotron, the Scientific Council recommends that the JINR Directorate develop the possibility of implementing a project of a compact research infrastructure for proton therapy at JINR.

Common issues

The Scientific Council notes the efforts by the University Centre (UC) in coordination and support of the educational and human resource development programmes at JINR within the concluding theme “Organization, Support, and Development of JINR Educational Programmes”. As part of this theme, one of the main issues and functions of JINR is being implemented — that of attracting talented young people and partner scientific research organizations of the Member States to JINR. In order to accomplish this, conditions are being created at JINR to assign Bachelor, Master, and PhD students from Member-State universities to work on their theses. Together with JINR Laboratories, the UC organizes and runs student programmes of various levels, which may attract talented young people and ensure the continuity of JINR’s scientific schools. The Scientific Council considers it important to continue these activities within the framework of the new theme “Organization, Support and Development of the JINR Human Resources Programme” proposed for 2019–2023, enhancing the cooperation with leading universities of the Member States to attract young people to work on JINR’s flagship projects.

Reports by young scientists

The Scientific Council appreciates the following reports by young scientists, selected by the PACs for presentation at this session: “How robust is a third family of compact stars against pasta phase effects?”, “Fusion-fission and quasi-fission in the near-barrier reaction of $^{32}\text{S} + ^{197}\text{Au}$ ”, and “Analysis of the working ability of a planar graphene tunnel field-effect transistor in the presence of edge vacancies”, and thanks the respective speakers: A. Ayriyan (LIT), I. Harca (FLNR), and A. Glebov (BLTP). The Scientific Council welcomes such selected reports in the future.

IV. Awards and prizes

The Scientific Council congratulates Professors G. Fogli (University and INFN, Bari, Italy) and E. Lisi (INFN, Bari, Italy) on the award of the B. Pontecorvo Prize for their pioneering contribution to the development of global analysis of neutrino oscillation

data from different experiments. The Scientific Council thanks them for their excellent presentations.

The Scientific Council approves the Jury's recommendations on the award of the V. Dzhelepov Prize to Professor V. Komarov (JINR) for his pioneering work on the construction of the first channel for proton therapy at the JINR synchrocyclotron.

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

V. Election of the Co-chairman of the Scientific Council

The Scientific Council elected Professor C. Borcea as Co-chairman of the Scientific Council for a term of three years.

VI. Elections and announcement of vacancies in the directorates of JINR Laboratories

The Scientific Council agrees with the proposal made by JINR Director V. Matveev to postpone the election of the Director of the Flerov Laboratory of Nuclear Reactions, previously announced for September 2018, by one and a half years, until the 127th session of the Scientific Council in February 2020. According to the Regulation, a new election date will be announced at the next session of the Scientific Council in February 2019.

The Scientific Council elected V. Bednyakov as Director of the Dzhelepov Laboratory of Nuclear Problems (DLNP) for a second term of five years.

The Scientific Council announces the vacancies of positions of DLNP Deputy Directors. The endorsement of appointments will take place at the next session of the Scientific Council in February 2019.

The Scientific Council endorsed the appointment of O. Culicov, N. Kučerka, and E. Lychagin as Deputy Directors of the Frank Laboratory of Neutron Physics (FLNP), until the completion of the term of office of FLNP Director V. Shvetsov.

The Scientific Council endorsed the appointment of J. Buša and T. Strizh as Deputy Directors of the Laboratory of Information Technologies (LIT) until the completion of the term of office of LIT Director V. Korenkov. The Scientific Council announces the vacancy of a third Deputy Director position at LIT. The endorsement of appointment will take place at the next session of the Scientific Council in February 2019.

The Scientific Council announces the vacancies of positions of the Directors of the Veksler and Baldin Laboratory of High Energy Physics and of the Laboratory of Radiation Biology. The elections will take place at the 126th session of the Scientific Council in September 2019.

VII. Next session of the Scientific Council

The 125th session of the Scientific Council will be held on 21–22 February 2019.



V. Matveev

Chairman of the Scientific Council



C. Borcea

Co-chairman of the Scientific Council



A. Sorin

Secretary of the Scientific Council