

### I. General considerations

The Scientific Council welcomes the comprehensive report presented by JINR Director A. Sissakian concerning the implementation of the current Programme of the Scientific Research and Development of JINR (2003–2009) and the key features of the Seven-Year Plan for the Development of JINR for 2010–2016.

The Scientific Council congratulates the Directorate and the international staff of JINR on the complete and successful realization of the current seven-year scientific programme and highly appreciates the valuable contributions to the advancement of science and technology in a world view that have been achieved as part of this programme. The major milestones achieved in implementing this programme provide a solid basis for further scientific and technological development of JINR.

The Scientific Council recognizes the significant scientific accomplishments of JINR scientists in 2009 in the fields of particle physics, nuclear physics, and condensed matter physics, as well as the noticeable progress in the areas of information technology, education of young scientists, and innovative developments. As several examples in these fields, the Scientific Council wishes to note:

- the two recent successful runs of the Nuclotron for experiments and for complex tests of its vital systems for the future operation of the Nuclotron-M/NICA facility, in particular, the power supply and quench protection systems at cycle with a 1.5 T magnetic field, upgraded cryogenics;

- the start-up of the 1st phase of the IREN facility and progress towards achieving its design parameters;

- the beginning of the unique experiment on the synthesis of element 117 in the  $^{249}\text{Bk} + ^{48}\text{Ca}$  reaction, in partnership with the Oak Ridge National Laboratory (USA);

- the commissioning of the high-speed 20 Gbps telecommunication channel JINR–Moscow with the availability of the implemented technological solutions for the further extension of the channel bandwidth.

The Scientific Council highly appreciates the new efforts of the JINR Directorate for the further development of partnership programmes with Member States and other countries. It notes, in particular, the recent conclusion of the government-level agreement with the Arab Republic of Egypt, the signature of the Letter of Intent with the Hungarian Republic concerning intensification of joint basic and applied research at JINR,

the extension of the Agreement between JINR and the Federal Ministry of Education and Research (BMBF) of Germany until the end of 2011 and the decision of the German side about the increase of the annual contribution of Germany to the JINR budget.

The Scientific Council notes with satisfaction that due to the efforts of the Member States the implementation of the JINR budget in the past several years has been achieved at the level of 100% of the planned budget, making it possible to realize the current scientific programme. The Scientific Council emphasizes again the importance of the annual increase of the budget in 2010–2016, planned according to the budget forecast approved by the Committee of Plenipotentiaries, for achieving the milestones of the development strategy for the next seven-year period, as outlined in the report by Director A. Sissakian.

## **II. Recommendations concerning the next seven-year scientific programme**

The Scientific Council thanks the JINR Directorate and its working group for preparing the final draft of the Seven-Year Plan for the Development of JINR for 2010–2016 and for making the written materials on this plan available well in advance of this session.

The Scientific Council notes the detailed reports covering this plan in the fields of particle physics and high-energy heavy-ion physics, presented by Vice-Director R. Lednický, low- and intermediate-energy nuclear physics, nuclear physics with neutrons, and condensed matter physics, presented by Vice-Director M. Itkis, educational programmes, presented by S. Pakuliak, Acting Director of the University Centre, concerning the development of the engineering infrastructure and information technologies, presented by Chief Engineer G. Shirkov, innovative activities, staff and social issues, presented by N. Lenskaya, Deputy Head of the Human Resources and Innovation Activity Office, and concerning the financial support for the projected activities, presented by V. Katrasev, Head of the Finance and Economics Office.

The Scientific Council also notes the status of the major projects of basic facilities: the NICA/MPD facility, the cyclotron complex DRIBs-III, the IBR-2M reactor and neutron spectrometers, presented in the reports by VBLHEP Acting Director V. Kekelidze, FLNR Director S. Dmitriev, and FLNP Director A. Belushkin.

The Scientific Council highly appreciates the concerted effort by the JINR Directorate to upgrade and modernize the JINR basic facilities and its strategic plan to develop state-of-the-art instrumentation to create new scientific opportunities for the future, and to keep JINR at the forefront of basic research in a world view. The success of this work is essential to sustain JINR as a world-leading research centre attractive to the Member

States and other collaborating institutions. The Scientific Council also commends the use by the Directorate of modern project management tools to ensure timely and efficient construction of the new facilities and detectors which are planned.

The Scientific Council recommends that the JINR Directorate communicate the plans of the Institute future facilities and detectors to the European Commission departments for science and research to ensure the JINR strategic plan for the future research programme is incorporated into planning by the European research community.

The Scientific Council also highly appreciates the high number of facility hours being delivered for the ongoing scientific programme. It looks forward at future meetings to further reports on the effectiveness with which these hours are being used for new advances in basic and applied science.

The Scientific Council strongly endorses the plan presented by Vice-Director M. Itkis to upgrade the facilities of the Flerov Laboratory to allow it to continue to be a world-leading laboratory for nuclear physics research.

The Scientific Council highly appreciates the progress made in the effort to upgrade the Nuclotron to meet the performance required for the future NICA/MPD programme. The Scientific Council notes that the plan to construct this facility is aggressive and looks forward to a report at a future meeting by the Chairperson of the Machine Advisory Committee for the Nuclotron-M/NICA accelerator complex concerning the soundness of the cost and schedule plan, and the readiness of the project for full construction.

The Scientific Council notes that in addition to research topics already planned for the NICA/MPD facility, an opportunity to extend basic knowledge of nuclear matter in the strangeness and antimatter sectors also exists and that this possibility should be studied.

The Scientific Council is pleased to note the ongoing effort at JINR to develop effective means of cancer treatment using particle beams. It strongly endorses the development, in parallel with proton therapy, of radiocarbon therapy which offers significant advantages for some cancer treatments due to the increased sharpness of the Bragg peak for delivered ionization. The development of positron emission tomography is also strongly encouraged to afford comprehensive capability for cancer diagnosis and treatment at future facilities which JINR plans to develop.

The Scientific Council stresses that the next six months will be crucial for beginning analysis on LHC data and that close communication and coordination between JINR scientists and the staff of LIT will be needed to produce timely world-leading physics results in the highly competitive environment which will occur when first data become available.

The Scientific Council stresses that strong support of the educational programmes and the work of the JINR University Centre by the Directorate is one of the highest priorities of the Institute to ensure the future scientific and technological workforce needs of the Member States are met and to ensure that the next generation of talented young scientists are well trained and ready to meet future research challenges and opportunities.

The Scientific Council recommends that the JINR Directorate take into account the remarks and suggestions concerning the draft plan given at this session and submit it to the Committee of Plenipotentiaries in November 2009. The Scientific Council asks the CP to approve the Seven-Year Plan for the Development of JINR for 2010–2016 and to work, even during the present difficult financial period in some Member States, to try to ensure the requested financial support for its successful realization.

The Scientific Council looks forward at its future meetings to regular progress reports concerning implementation of the seven-year plan.

### **III. Recommendations in connection with the PACs**

The Scientific Council concurs with the recommendations made by the PACs at their June 2009 meetings as reported at this session by Professors T. Hallman, W. Greiner, and V. Kantser.

#### Particle Physics Issues

The Scientific Council appreciates the significant advances that have been made in upgrading the VBLHEP accelerator complex and in the preparation of the NICA project, as well as the intention of several new external laboratories to sign the MoU concerning the realization of the project.

The Scientific Council supports the recommendation of the PAC that the JINR Directorate should provide the required funding for the Nuclotron-M project stages in accordance with the programme and time schedule for the successful completion of this project.

The Scientific Council emphasizes the importance of an in-person meeting of the Machine Advisory Committee (MAC) for the Nuclotron-M/NICA accelerator complex, chaired by Professor B. Sharkov (ITEP, Moscow), at JINR within the next six months so that in addition to in-depth discussion, the members of the MAC can visit the Nuclotron as well as other important engineering sites relevant to the Nuclotron-M and NICA/MPD projects.

The Scientific Council is pleased to note that the MPD development team presented at the PAC meeting a professional, well-organized first draft of the Conceptual Design

Report for the MPD detector. The Scientific Council endorses the proposed concept and supports the strategy of stage-by-stage construction of this detector. It also notes the necessity of a critical assessment of the physics ideas presented in the white paper for simulations of the relevant physics channels.

The Scientific Council shares the opinion of the PAC concerning the near-term priority of introducing a chapter in the MPD Conceptual Design Report or the forthcoming NICA physics white paper which shows, based on first-order calculations, the feasibility, taking into account essential characteristics such as the expected luminosity and the detector acceptance, of measuring key observables related to the main physics themes of the project. These calculations should be followed up with detailed modeling of the detector capability.

The Scientific Council welcomes the report presented at the PAC meeting on the proposal to begin consolidation of the VBLHEP physics programme and recommends that the JINR Directorate support the implementation of this programme.

The Scientific Council takes note of the information about readiness of the JINR groups participating in the ALICE, ATLAS, and CMS experiments for data taking and analysis. Documented projects for JINR's further participation in these experiments should be received by the PAC at its next meeting.

The Scientific Council supports the PAC's recommendations on the new projects NA62, HyperNIS, DSS, ALPOM-2, and "Development of prototype units for a complex of carbon radiotherapy", as well as on the continuation of the current activities beyond 2009, as outlined in the PAC report.

The Scientific Council strongly agrees with the PAC for Particle Physics that to maximize the possibility of the ILC being sited in the Moscow Region, a continuous vigorous effort by the JINR Directorate is necessary to establish the ILC as a Russian national priority through dialogue with the Russian national authority.

#### Nuclear Physics Issues

The Scientific Council notes the significance and high efficiency of the studies of nuclei far from the stability line, which have been performed at the Flerov Laboratory. A number of experiments carried out with the use of actinide targets and of beams of  $^{48}\text{Ca}$  ions have resulted in the synthesis and/or discovery of 6 new elements ( $Z=112, 113, 114, 115, 116, 118$ ) and of 34 new heavy nuclides.

The Scientific Council is in full agreement with the seven-year plan stating the need for construction of a high-intensity accelerator of heavy ions. In particular, it is of great interest to provide acceleration of ions from carbon to uranium up to the energy range

5-10 MeV/n with stepwise and smooth variation.

The Scientific Council recommends supporting the DLNP proposals for the next seven-year plan aimed at the study of neutrino physics and dark matter (double-beta decay and neutrino magnetic moment: projects NEMO-3, GERDA&MAJORANA, GEMMA-II) and astrophysics (projects LESI, EDELWEISS-II). In recent years, all these projects have made great progress in investigation of neutrino masses, especially in double-beta searches of elements  $^{76}\text{Ge}$ ,  $^{100}\text{Mo}$ , and  $^{82}\text{Se}$ ; in search for a neutrino magnetic moment and for dark matter signals, as well as in measurements of basic cross sections for  $pd$  and  $dd$  reactions at the lowest energies that are important for understanding the burning of the Sun and the stars. With the proposed improvements of the new stages, there lies in the future a great discovery potential.

#### Condensed Matter Physics Issues

The Scientific Council is pleased to note that the IBR-2 reactor modernization is proceeding in full accordance with the technical and financial plans.

The Scientific Council takes note of progress in the modernization of the spectrometer complex for the IBR-2M reactor. The concentration of the available resources on the first-priority instruments (DN-6, GRAINS, SKAT/EPSILON) is essential to ensure that the schedule of work on them is observed. With regard to science, the spectrometer complex modernization should incorporate plans for its long-term complementarity with the European Spallation Source (ESS) project and the future development of synchrotron radiation techniques. The Scientific Council notes that adequate funding from the JINR budget should be received to complete these activities on time.

The Scientific Council appreciates the high level of condensed matter research performed by teams at FLNP, BLTP, DLNP, LIT, and LRB, and is pleased to note the increased number of high-quality scientific reports and poster presentations by young scientists from these laboratories.

#### Common Issues

The Scientific Council appreciates the collaboration of the JINR University Centre (UC) with the Plenipotentiaries of the Member States in the development of a special system of scholarships/grants in order to engage students from a larger number of Member States to the postgraduate studies at JINR. Intensification of contacts with the Plenipotentiaries in order to organize regular visits to the UC of natural science teachers and school pupils from Member States is also recommended.

#### **IV. Memberships of the PACs**

The Scientific Council deeply regrets the sad loss of Professor J. Nassalski, Chairperson of the PAC for Particle Physics, who has made an outstanding contribution to the development of scientific collaboration between JINR and Polish research centres.

As proposed by the JINR Directorate, the Scientific Council appoints Professor E. Tomasi-Gustafsson (IRFU, CEA Saclay, France) as Chairperson of the PAC for Particle Physics for a term of one year. The Scientific Council also appoints Professors J. Mnich (DESY, Hamburg, Germany) and I. Tserruya (WIS, Rehovot, Israel) as new members of this PAC for a term of three years.

As proposed by the JINR Directorate, the Scientific Council appoints Professor Z. Vilakazi (iThemba LABS, Cape Town, South Africa) as a new member of the PAC for Nuclear Physics for a term of three years.

As proposed by the JINR Directorate, the Scientific Council appoints Professor J. Wąsicki (IP, Poznan, Poland) as a new member of the PAC for Condensed Matter Physics for a term of three years. The Scientific Council thanks the outgoing member Professor P. Mikula for his very successful work in this PAC.

#### **V. Scientific reports**

The Scientific Council highly appreciates the reports "Perspectives of the collaboration between the Oak Ridge National Laboratory (ORNL) and JINR in the studies of superheavy elements" co-presented by Professor J. Roberto for ORNL and by Professor Yu. Oganessian for JINR, and thanks the speakers.

#### **VI. JINR prizes**

The Scientific Council congratulates the laureates of the JINR prizes for 2008 — winners of the annual scientific research competition in the fields of theoretical physics, experimental physics, physics instruments and methods, and applied physics.

#### **VII. Elections and announcement of vacancies in the directorates of JINR Laboratories**

The Scientific Council elected by ballot Professor V. Kekelidze as Director of the Veksler and Baldin Laboratory of High Energy Physics (VBLHEP) and Professor E. Krasavin as Director of the Laboratory of Radiation Biology (LRB) for a term of five years.

The Scientific Council announces the vacancies of the positions of Deputy Directors of VBLHEP and LRB. The elections for these positions will take place at the 107th session of the Scientific Council.

### **VIII. Next session of the Scientific Council**

The 107th session of the Scientific Council will be held on 18–19 February 2010.

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Chairman of the Scientific Council

I. Wilhelm

Co-chairman of the Scientific Council

N. Russakovich

Secretary of the Scientific Council