

I. Preamble

The Scientific Council thanks Professor V. Kadyshevsky and his Directorate team for their dedication and commitment to maintain JINR as a leading international scientific centre under very challenging conditions. The Scientific Council welcomes the road map for JINR that is being developed by Professor A. Sissakian and his new Directorate team, which is revealing many scientific options for the future. The Scientific Council urges the Committee of Plenipotentiaries to make available sufficient resources to allow JINR and its Member States to take full advantage of these new opportunities in basic and applied science.

The Scientific Council highly appreciates the participation in this session of A. Fursenko, Chairman of the JINR Committee of Plenipotentiaries and the Russian Minister of Education and Science, and of S. Mazurenko, Head of the Russian Federal Agency for Science and Innovation, and their presentations in support of the further development of JINR 's scientific research, education and innovation activities.

II. General considerations

1. The Scientific Council takes note of the comprehensive report presented by JINR Director A. Sissakian on the implementation of the recommendations made at the 97th and 98th sessions of the Scientific Council.

The Scientific Council is pleased to note that most of its recommendations to the JINR Directorate concerning the Scientific Programme of JINR, the operation and upgrade of the basic facilities, and the construction of new facilities are being implemented.

The Scientific Council recognizes the significant scientific accomplishments of JINR scientists in 2005 in the fields of particle physics, nuclear physics, and condensed matter physics, and wishes them new achievements in the future.

2. The Scientific Council welcomes the appointment of V. Kadyshevsky as Scientific Leader of JINR and his continuation in the membership of the Scientific Council.

The Scientific Council notes that, in accordance with the Institute Charter, JINR Director A. Sissakian has nominated M. Itkis and R. Lednický as Vice-Directors of JINR, N. Russakovich as Chief Scientific Secretary of JINR, and G. Shirkov as Chief Engineer of JINR. Beginning 1 January 2006 they are acting members of the Directorate until their approval for these positions at the next meeting of the JINR Committee of Plenipotentiaries in March 2006.

The Scientific Council takes note of the information concerning the organization of the JINR Laboratory of Radiation Biology and of the appointment of E. Krasavin as Director-Organizer of this Laboratory.

The Scientific Council notes the appointment of D. Fursaev as new Director of the JINR University Centre (UC). The Scientific Council thanks S. Ivanova for her successful work during 15 years as Director of the UC and highly appreciates her invaluable contributions to the implementation of the Institute's educational programme.

III. Discussion of the road maps of the JINR future research programme

1. In response to the Scientific Council's previous recommendation, Professors A. Sissakian, A. Olchevski, M. Itkis, and A. Belushkin presented updated road maps with emphasis made on the strategic goals of the Institute's research programme for the coming 10 years. The Scientific Council endorses these documents, elaborated by the Institute's Directorate and discussed by the internal scientific councils of JINR and its laboratories as well as at the November-2005 meetings of the PACs, and considers them as a solid basis for further development. Taking into consideration that the strategic road maps of the three programmes are still in the discussion process, **the Scientific Council recommends that the PACs and the JINR Directorate scrutinize the present assignment of research topics and resources to the programmes of particle physics, nuclear physics and condensed matter physics.** This review should give a strong emphasis on the underlying science. The Scientific Council agrees with the Directorate's proposal to update the road map in 2008–2009 for its further consideration.

2. In particular, the Scientific Council invited the JINR Directorate and experts to develop proposals concerning the development of the Institute's future scientific basis, including possible megaprojects such as the International Linear Collider (ILC), which obviously have great importance for the long-term future of JINR. The Scientific Council takes note of JINR's plans for participation in the ILC activity presented by DLNP Director A. Olchevski. Taking into account that this project is considered by the community as a global priority for high-energy physics, **the Scientific Council encourages JINR to be involved in the ILC design effort and to invest appropriate resources in scientific and technological developments to support its ability to play a leading role in the ILC project.** The Scientific Council supports the intention of JINR to participate actively in the ILC project and the possible interest of JINR to host the ILC, which was expressed by Professor A. Sissakian at the meeting of the ILC Global Design Effort Group held in Frascati (Italy) in December 2005.

The Scientific Council would like to be informed regularly about the progress of these activities.

3. At one of its recent sessions, the Scientific Council strongly supported the proposal of the JINR Directorate for an intensive effort to create an “innovation belt” around the Institute. The Scientific Council takes note of the information on JINR’s participation in innovation activity, presented by the Assistant to the JINR Director for Innovative Development, A. Ruzaev, which includes efforts to facilitate public-private partnership in developing the triangle “research-innovations-education” in Dubna, creation of a Centre for Science and Technology Commercialization within the project EuropeAid/115381/C/SV/RU, and participation in the project of first venture funds in Russia.

The Scientific Council supports this activity, carried out in the context of the “Strategy of the Russian Federation on the Development of Science and Innovations till 2010”, and would like to be informed about its progress at future sessions.

The Scientific Council welcomes the agreement, signed on 18 January 2006, between the Government of the Russian Federation, the Government of the Moscow Region and the Administration of Dubna on the establishment of a technological-and-innovative free economic zone in Dubna, and regards this decision as a great new opportunity for advancing JINR’s innovation activity.

4. The Scientific Council takes note of the report “Progress of implementation of the programme *Young Staff at JINR*” and of the information concerning the development of the JINR engineering and technical infrastructure in 2006–2010, presented by JINR Acting Chief Engineer G. Shirkov as supplements to the Institute’s 7-year Scientific Programme. The Scientific Council emphasizes again the importance of these issues for the future of JINR and would appreciate further progress reports at its sessions.

IV. Considerations concerning the IREN project

The Scientific Council was pleased to hear the information, presented by FLNP Deputy Director V. Shvetsov, about the successful start-up of dismantling the IBR-30 reactor and the recent progress in the creation and adjustment of LINAC components for the IREN project.

The Scientific Council was informed about the decision of the JINR and FLNP Directorates to reduce the full-scale IREN project to its first stage (LINAC with a non-multiplying target, and a stand for applied research) scheduled for completion by the end of 2007. The plan of investment for the first stage of IREN should be presented for

endorsement by the Directorate at the meeting of the PAC for Nuclear Physics in April 2006. **The Scientific Council recommends that the Directorate and this PAC estimate the impact of this choice on the excellence of the scientific programme which may be reduced.**

V. Considerations concerning the current JINR scientific programme

1. The Scientific Council takes note of the presentations made by the JINR Director, based on the written reports prepared by the Laboratories, and by the representatives of the PACs, and endorses “The JINR Topical Plan of Research and International Cooperation for 2006”.

2. Taking into account the proposals of the JINR Directorate and the recommendations of the PACs, the Scientific Council endorses the following priority activities in 2006 on which financial and manpower resources should be focused:

In-house facilities

– operation and development of the Nuclotron accelerator complex, obtaining of a wider range of accelerated particles and nuclei, improvement of the beam extraction system; acceleration of deuterons up to the maximum energy of 6 GeV/nucleon and the installation of a polarized ion source for increasing the intensity of deuterons up to 10^{10} per cycle;

– modernization of the IBR-2 reactor according to the schedule of activities approved by the agreement between JINR and the Russian Agency for Atomic Energy;

– completion of the dismantling of the IBR-30 reactor, assembly and complex tests of subsystems of the LUE-200 accelerator in the context of completion of the first stage of the IREN project in 2007;

– reconstruction of the FLNR accelerators; optimization of the parameters of the ^6He beams produced at the DRIBs accelerator complex;

– recovery of the Phasotron and of the beam transportation channel to the Hadron Therapy Complex;

– further development of JINR’s telecommunication links, networking, computing and information infrastructure, including Grid technologies;

Ongoing research programmes and projects

– theoretical studies in challenging issues of particle physics, modern mathematical physics, nuclear physics, condensed matter physics, and computational mathematics and physics, with a view to supporting experimental work at JINR and participating laboratories;

– continued participation in frontier experiments aimed at studying the fundamental properties of elementary particles and their interactions as well as the spin structure of nucleons; study of rare, weak processes aimed at verification of the Standard Model of particle interactions and the search for new physics phenomena beyond this Model; precise measurement of direct *CP*-violation; thorough investigations of the nature and properties of the neutrino at high, low and intermediate energies, participation in high-energy physics experiments at accelerator facilities at IHEP (Protvino), CERN, DESY, BNL and FNAL;

– participation in construction of accelerator subsystems for the LHC and in the R&D for the ILC as well as development of promising accelerator technologies;

– continuation of relativistic nuclear interaction studies focused on the search for manifestations of quark and gluon degrees of freedom in nuclei and on properties of nuclear matter at high energies, as well as studies of the spin structure of the lightest nuclei; experiments at the Nuclotron (JINR) as well as experiments at the accelerators of CERN, BNL (RHIC), GSI (SIS) and RIKEN;

– study of reactions being promising for the synthesis of superheavy elements with $Z > 118$; physical and chemical studies of transactinide nuclei, including their direct mass identification using the MASHA mass analyser; alpha, beta and gamma spectroscopy of transfermium nuclei; experiments with beams of the ${}^6\text{He}$ and ${}^8\text{He}$ radioactive ions;

– continuation of research in the field of nuclear physics with neutrons, including investigations of the fundamental symmetries in neutron-nucleus interactions and of the properties of the neutron; continuation of applied research activities concerning the REGATA project (biomonitoring) and the R&D of neutron detectors for spacecrafts;

– condensed matter studies by neutron scattering; research and development of spectrometers, detectors, sample environment systems and data acquisition systems for the IBR-2 reactor complex;

– investigation of the effects of ionizing radiation with different physical characteristics on the genetic structures of cells; studies of molecular photo- and radiobiological processes in the proteins of the human eye;

– studies and practical work in the field of cancer treatment at the medical beams of the Phasotron and at the new ion beam of the Nuclotron, with dedicated financial support coming mainly from non-budgetary sources;

– development of the JINR Educational Programme, including special-purpose training of specialists for Member States, implementation of the project “Dubna International Advanced School of Theoretical Physics”, annually-held summer student

practical courses in the JINR fields of research, and involvement for work at JINR laboratories of students and graduates from leading higher-education institutions of Member States.

3. The Scientific Council reiterates the need for coordination of various activities in the field of biomedical physics in connection with information technology and the “innovation belt”.

VI. Recommendations in connection with the PACs

The Scientific Council concurs with the recommendations made by the PACs at their November 2005 meetings as reported at this session by Professors T. Hallman, N. Janeva, and W. Nawrocik.

Common Issues

At their meetings, the PACs considered the respective research programmes proposed by the laboratories for the years 2006–2008 in accordance with the available financial and human resources. In accordance with the wishes of the JINR Directorate, the recommendations of the PACs on the opening of new themes, on the extension of themes and on the initiation of new projects were made for a one-year period only.

The PACs also discussed the road maps of the Institute’s research programme in their respective fields. The Scientific Council thanks the PACs for their work and for presenting their views at this session. These road maps should be integrated into the JINR Topical Plan of Research beginning 2007.

Particle Physics Issues

The Scientific Council endorses the main lines of the JINR Programme of Particle and Relativistic Nuclear Physics Research for the period 2006–2008.

The Scientific Council notes that the road map in the field of particle physics reflects the Institute’s desire to continue the participation of JINR scientists in large international projects as well as the Institute’s commitments for further development of the Nuclotron and its experimental programme. The recommendations of the PAC concerning incorporation of the assumed manpower and funding profiles into the road map have been taken into account.

The Scientific Council concurs with the PAC that compelling future programme of particle physics being planned by JINR should be visible in a world view and **recommends JINR’s participation in the open symposium planned by the CERN Council Strategy Group to develop a strategic plan for the future of high-energy physics in Europe.**

The Scientific Council strongly supports the PAC's recommendations on the preparation of the software and computing capability at JINR to allow JINR scientists to produce first scientific results in the CMS, ATLAS and ALICE experiments at the time of LHC start-up and is pleased to note the successful ongoing activity in this area.

The Scientific Council supports the recommendations of the PAC on the new projects ("Measurement of the rare decay $K^+ \rightarrow \pi^+ \nu \bar{\nu}$ in the experiment at the CERN SPS", "Experiments with charged kaons at the separated kaon beam of IHEP's accelerator", and "A study of asymmetries of the spin- and structure-dependent interactions of nucleons in experiments with polarized targets and beams"), on the continuation of the current activities beyond 2005, and on the closure of 14 projects as outlined in the PAC report.

Nuclear Physics Issues

The Scientific Council endorses the main lines of the JINR Programme of Nuclear Physics Research for the period 2006–2008.

The Scientific Council notes that the upgrade of the U400M–U400 accelerator complex is essential for the challenging research programme of FLNR and for maintaining its leadership in the field. The acceleration of low-energy beams at U400M should be realized with particular urgency. These would allow an uninterrupted running of experiments during the modernization of U400.

The Scientific Council takes note of the PAC's conclusions concerning the future of the IREN project (see Section III).

The Scientific Council takes note of the status of the project "Subcritical Assembly at Dubna" (project SAD). **It recommends continuation of the collaboration between the SAD project and the Integrated Project EUROTRANS with the support of the International Science and Technology Centre (ISTC).** For a project of this magnitude, special funds should be sought from national energy agencies. The PAC recommended that the FLNP and DLNP directorates consider the possibility of including SAD in the JINR Topical Plan of Research as a separate theme of first priority. The Scientific Council expects to be regularly informed about the progress of the SAD project.

The Scientific Council supports the recommendations of the PAC on the continuation of the current activities beyond 2005 as outlined in the PAC report.

Condensed Matter Physics Issues

The Scientific Council endorses the main lines of the JINR Programme of Condensed Matter Physics Research for the period 2006–2008.

The Scientific Council reiterates the high priority of the modernization of the IBR-2 reactor for scientific research in condensed matter physics and life sciences.

It takes note of the funding of this activity in 2005 in accordance with the agreement between the Russian Federal Agency for Atomic Energy and JINR, and expects that the JINR and FLNP directorates will take all necessary measures to continue this work according to schedule.

The Scientific Council shares the concern of the PAC that the momentum of the condensed matter programme should be maintained over the shut-down period of the IBR-2 reactor in 2007–2010. It urges the FLNP Directorate to undertake necessary steps to secure the continuing research activity of young scientists based at JINR in this field.

The Scientific Council notes the plans discussed by the PAC for the development of spectrometers at IBR-2 in accordance with the needs of the Institute's strategic research programme in condensed matter physics.

The Scientific Council notes the opinion of the PAC concerning the new project "Free-electron lasers based on LINAC-800". The PAC welcomes proposals to strengthen the JINR programmes in condensed matter science, and in this context is keen to keep a watching brief on the FEL project. However it believes that this new project should be considered again in the future when it is more mature.

The Scientific Council supports the recommendations of the PAC on the continuation of the current activities beyond 2005 as outlined in the PAC report.

VII. Memberships of the PACs

1. The Scientific Council thanks Professor N. Rowley for his very successful work as Chairperson of the PAC for Nuclear Physics.

As proposed by the JINR Directorate, the Scientific Council appoints Professor N. Janeva (INRNE, Sofia, Bulgaria) as Chairperson of the PAC for Nuclear Physics for a term of one year, and Professor W. Greiner (IAS, Frankfurt, Germany) as a new member of this PAC for a term of three years.

2. The Scientific Council notes the terms of duties of the current members of the PACs and **reiterates the wish for fixed terms of three years for each PAC member with the possibility of extension for one more term, so as to ensure a regular rotation of the membership.**

VIII. Procedure of the Scientific Council

The Scientific Council endorses the amendment in the "Rules of Procedure of the JINR Scientific Council" (Appendix 1, Section V, item 3) concerning the position of

executive co-chairman of the Scientific Council, and **recommends that the Committee of Plenipotentiaries approve this amendment.**

IX. Announcement of vacant positions

According to the JINR regulations, the Scientific Council announces vacancies of the Directors of the Veksler-Baldin Laboratory of High Energies, Flerov Laboratory of Nuclear Reactions, Laboratory of Particle Physics and of the Laboratory of Radiation Biology. The election for these positions will take place at the 101st session of the Scientific Council in January 2007.

The Scientific Council agrees with the proposal of the JINR Directorate to postpone the election of the Directors of the Bogoliubov Laboratory of Theoretical Physics and of the Frank Laboratory of Neutron Physics till the 101st session of the Scientific Council.

X. JINR–RAS cooperation in the fields of radiation biology and radiation medicine

The Scientific Council appreciates the report presented by A. Konovalov, Director of the N. Burdenko Scientific Research Institute of Neurosurgery (Moscow) on the cooperation between the Russian Academy of Sciences and JINR in the fields of radiation biology and radiation medicine, and welcomes this cooperation.

XI. Scientific reports

The Scientific Council notes with interest the scientific reports presented at this session:

“The Quantum Number Colour, Coloured Quarks and QCD”

“Search for a Mixed Phase of Strongly Interacting Matter at the Nuclotron”,

“Precise Predictions of Low-Energy QCD and Their Check by the DIRAC experiment”,

“Peculiarities of the Production and Decay of Superheavy Elements”.

The Council thanks the speakers Professors A. Tavkhelidze, A. Sorin, L. Nemenov, and M. Itkis for their informative presentations.

Based on the report by A. Sorin, the Scientific Council recommends that the PACs for Particle Physics and Nuclear Physics invite proposals to study the experimental feasibility of “mixed phase” of strongly interacting matter at the Nuclotron.

XII. JINR prizes

1. The Scientific Council approves the Jury's recommendations on the JINR prizes for 2005 (Appendix 2).

2. The Scientific Council congratulates Professors S. Mikheyev (Institute for Nuclear Research (INR), Moscow, Russia), A. Smirnov (INR, Moscow, and ICTP, Trieste, Italy) and L. Wolfenstein (Carnegie Mellon University, Pittsburg, USA) on being awarded the 2005 B. Pontecorvo Prize for the prediction and study of the influence of matter on neutrino oscillations, now known as “the MSW (Mikheyev–Smirnov–Wolfenstein) effect”.

The Scientific Council thanks Professor S. Mikheyev for his scientific presentation.

XIII. Honours and awards

The Scientific Council endorses the JINR Directorate's proposals to award the title “Honorary Doctor of JINR” to Professors J. Dietrich, N. Rowley, Č. Šimane, and A. Skrinsky, in recognition of their outstanding contributions to the advancement of science and the education of young scientists, and congratulates them.

The Scientific Council congratulates FLNP Chief Engineer V. Ananiev on being awarded the Russian Order of Honour, in recognition of his long and successful professional activity, and highly appreciates his important contributions to the operation of the IBR-2 reactor and to its ongoing modernization programme.

The Scientific Council congratulates Professor E. Donets (VBLHE) and his team of researchers on receiving the International Ion Source Prize “Brightness Award” for the “Development of an Electron String Source of Highly Charged Ions”.

XIV. Next session of the Scientific Council

The 100th session of the Scientific Council will be held on 27 March 2006.

A. Sissakian
Chairman of the Scientific Council

N. Russakovich
Secretary of the Scientific Council