

I. General considerations

1. The Scientific Council takes note of the comprehensive report presented by JINR Director V. Kadyshevsky on the implementation of the recommendations made at the 95th and 96th sessions of the Scientific Council and on progress in implementing “The Programme of JINR’s Scientific Research and Development for 2003–2009”.

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 2004 in the fields of particle physics, nuclear physics, and condensed matter physics, and wishes them new achievements in the future.

The Scientific Council congratulates Professor R. Jolos on receiving the 2004 Humboldt Research Award, Professor I. Meshkov on receiving the 2004 Prize of the European Physical Society Accelerator Group, and Professor D. Shirkov on receiving the N. Bogoliubov Gold Medal of the Russian Academy of Sciences, in recognition of their outstanding scientific achievements.

The Scientific Council notes that due to several important scientific duties of V. Kekelidze, Director of the Laboratory of Particle Physics (LPP), which necessitate his long-term stay at CERN, the JINR Directorate proposes to appoint LPP Deputy Director R. Lednický as Acting Director of this Laboratory from 1 February 2005 to 31 January 2006. The Scientific Council agrees to this proposal.

The Scientific Council was informed by the JINR Directorate that it is considering the reorganization of the Department of Radiation and Radiobiological Research into a Laboratory of Radiation Biology. The Scientific Council supports this idea and looks forward to a detailed report concerning this reorganization at a future session.

2. The Scientific Council was informed by JINR Vice-Director A. Sissakian about the Directorate’s recommendations concerning the future financing of research projects and themes and the Directorate’s plan to concentrate the financial and human resources on the most important directions of research. The Scientific Council supports the Directorate’s plan, together with the PACs and the internal scientific councils of JINR and its laboratories, to review, within one year and with well-defined criteria, the Institute’s research programme with a view to stopping projects of lower scientific impact, including

first-priority activities. The Council endorses these recommendations and looks forward to being informed about positive results of this work.

Specifically, in order to prepare a strategic plan for the Institute, the Scientific Council suggests that the three chairpersons of the PACs together with the JINR Directorate develop a road map for the coming 10 years. This close collaboration will define the main lines of research and scientific infrastructure, including the budget development for each field of activity. Some of the questions to be addressed in defining the road map have already been posed in a letter of Vice-Director A. Sissakian to the Chairperson of the PAC for Particle Physics, T. Hallman. The results of this process should be presented to the Scientific Council for discussion, possible amendments and approval. Once approved, the road map should serve the Directorate in its strategic planning and the PACs in their recommendations concerning priorities. The road map should be updated at least every three years by the Directorate, the PACs and the Scientific Council. The Council expects a first presentation about the road map at its next session in June 2005.

Emphasizing that fundamental scientific research integrated with educational programme activities remain the core mission of JINR, the Scientific Council strongly supports the proposal for an intensive effort to create an “innovation belt” around the Institute. Together with its main purpose — commercial high-technology developments — it should promote the economic conditions for science at JINR and solve a number of social problems for its staff. The Council looks forward to being informed at its future sessions about the organization of this activity as well as about the transfer of intellectual property rights.

3. The Scientific Council takes note of the report, presented by JINR Chief Engineer G. Shirkov, “Progress of implementation of the programmes *Development of the JINR Engineering and Technical Infrastructure* and *Young Staff at JINR*” which are 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 future sessions.

4. Noting that the United Nations has declared 2005 to be World Year of Physics, the Scientific Council urges JINR to participate fully in this event.

II. Considerations concerning the JINR Scientific Programme

1. The Scientific Council takes note of the reports presented by the JINR Director and by the PAC Chairpersons, and endorses “The JINR Topical Plan for Research and International Cooperation in 2005”.

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 2005 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 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;
- reconstruction of the U400 accelerator, implementation of work on the realization of the Dubna Radioactive Ion Beams (DRIBs) project;
- dismantling of the IBR-30 reactor;
- 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 modern mathematical physics, particle 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; study of rare, weak processes aimed at verification of the Standard Model of particle interactions and the search for new physics phenomena beyond the Standard Model; precise measurement of direct *CP*-violation; studies of nucleon structure and 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 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; in-house experiments mainly at the Nuclotron, as well as experiments at the accelerators of BNL (RHIC), GSI (SIS) and RIKEN;

– experiments focusing on the physical and chemical studies of superheavy elements together with their mass identification using the MASHA mass analyser, on-line gamma spectroscopy of heavy nuclei; experiments with radioactive ion beams;

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

– investigation of the effects of ionizing radiation on biological objects; studies and practical work in the field of cancer treatment at the Phasotron and at the proposed new beamline at the Nuclotron, with dedicated financial support to be given mainly from non-budgetary sources. The Council reiterates the need for coordination of activities in biomedical physics;

– development of the JINR Educational Programme, including special-purpose training of specialists for the Member States, the “Dubna International Advanced School of Theoretical Physics” and the summer student practical courses in JINR's fields of research.

3. The Scientific Council urges the FLNP and JINR Directorates to investigate whether a realistic new plan of investment for the IREN project is possible, as already requested by the PAC for Nuclear Physics at its 20th and 21st meetings and reiterated by the Scientific Council at its 96th session. The conclusions of this investigation should be presented to a meeting of the PAC for Nuclear Physics in 2005.

III. Recommendations in connection with the PACs

The Scientific Council concurs with the recommendations made by the PACs at their November 2004 meetings as reported at this session by Chairpersons T. Hallman, N. Rowley, and W. Nawrocik.

Particle Physics Issues

The Scientific Council endorses the main lines of the JINR Programme of Particle and Relativistic Nuclear Physics Research proposed by the laboratories for the period 2005–2007. It appreciates the intention of the PAC to review further this programme and reconsider the priorities of the projects and themes for 2006–2008 within one year, and looks forward to the results of this effort.

The Scientific Council supports the recommendations of the PAC on the new projects (addendum to the project DIRAC and “Search and study of eta-mesonic nuclei in pA -reactions at the Nuclotron”), on the continuation of the current activities beyond 2004, and on the closure of two projects as outlined in the PAC report.

The Council supports the PAC's recommendation that the movable polarized target

be implemented as soon as possible.

In response to the Scientific Council's recommendation, at its next meeting the PAC will consider the programme of the physics studies planned to be carried out by JINR physicists in the experiments at the LHC, RHIC and at the Tevatron and plans on the data analysis work.

Nuclear Physics Issues

The Scientific Council congratulates the Flerov Laboratory on the chemical identification of Db as the end product of an α -decay chain emanating from element Z=115. It recommends continuation, with first priority, of the physical and chemical studies of superheavy elements, and the important determination of atomic masses using the MASHA mass analyser. The Scientific Council notes the successful implementation of focal-plane γ -ray spectroscopy of very heavy nuclei and encourages further experiments and possible future developments in this field. The first complete exploitation (in December 2004) of DRIBs Phase I (light radioactive ion-beams) using a post-accelerated ^6He beam is noted with great satisfaction.

The Scientific Council highlights the results obtained in nucleus-neutrino angular correlation measurements of β -decay and electron and muon capture by various atomic nuclei (ANCOR project), and on the $p+d \rightarrow (pp)+n$ reaction in the energy range 0.5–2.0 GeV observed at COSY (Jülich) using the ANKE spectrometer. It recommends continuation of both of these projects, with first priority, within the framework of the DLNP programme of low- and intermediate-energy physics.

The excellent and extensive research programme of FLNP is noted. The decommissioning of the IBR-30 reactor should be completed with urgency, irrespective of the status of the IREN project, whose future should be decided by the Institute and Laboratory managements before the end of 2005.

Condensed Matter Physics Issues

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.

The Russian Agency for Atomic Energy (Rosatom) continues its significant support of this activity in accordance with the agreement with JINR signed in 2000. The Scientific Council is pleased to note that in 2004 the financial support of Rosatom for the IBR-2 modernization was contributed fully and on time. JINR also contributed 348 k\$ to this activity. This exceeds the planned amount and partially compensates the debt accumulated during 2000–2002.

The Scientific Council congratulates the staff of the Frank Laboratory of Neutron

Physics on starting, on 13 September 2004, the scheduled work for physics experiments at the reactor's peak power 1.5 MW.

The Scientific Council supports the R&D programme for the development of the neutron moderator complex for the future modernized reactor IBR-2M. A working group of instrument and moderator experts is encouraged by the PAC to ensure, during the IBR-2 shut-down period, the optimization of neutron extraction from the moderator system to each instrument. The park of spectrometers to be modernized during the shut-down period is going to be presented at the next PAC meeting.

The Scientific Council appreciates the realization of the first steps of the new organizational system for users of the IBR-2 reactor, and recommends that the FLNP Directorate do their utmost to attract new users.

Common Issues

Taking into account the financial situation at JINR, the Scientific Council concurs with the Directorate and the PACs that first-priority status be set for research activities for a one-year period only, beginning from the year 2005, pending the results of the future review of the whole of the Institute activities.

The Scientific Council endorses the recommendations of the three PACs on the opening the new theme "Mathematical support of experimental and theoretical studies conducted by JINR" proposed by the Laboratory of Information Technologies.

The Scientific Council notes the success of the physics practical courses for member-state students held by the University Centre from 29 June–29 July 2004 and of several schools for young scientists held in 2004 within the framework of the project "Dubna International Advanced School of Theoretical Physics". These activities within the Institute's Educational Programme are appreciated and should be clearly reflected in the budget.

IV. Memberships of the PACs

1. Upon proposal by the JINR Directorate, the Scientific Council appoints A. Ceccucci (CERN, Geneva, Switzerland) and V. Savrin (SINP, Moscow, Russia) as new members of the PAC for Particle Physics, and re-appoints T. Hallman as Chairperson of this PAC until June 2007.

2. The Scientific Council thanks Professors N. Tyurin and R. Voss for their most successful work as members of the PAC for Particle Physics.

3. The Scientific Council confirms the mandates of the PACs with their present memberships (Appendix 1) until June 2007 and looks forward to the rotation of PAC members as stipulated by the Regulation for the JINR PACs.

V. JINR–CERN Cooperation

The Scientific Council takes note of the status report “JINR–CERN Cooperation” presented by JINR Vice-Director A. Sissakian. It reiterates its high appreciation of the long-standing and mutually beneficial collaboration between these two international laboratories in research and science-related activities, and looks forward to its successful continuation.

The Scientific Council heard with interest the progress reports on JINR’s participation in the preparation of the ATLAS, CMS, ALICE detectors and of the dedicated physics programmes, presented by JINR group leaders N. Russakovich, I. Golutvin, and A. Vodopianov. The Council is pleased to note the successful implementation of the obligations undertaken by JINR for these instrumentation facilities. It welcomes the idea, expressed by Professor N. Russakovich, to organize a regular framework of the JINR groups involved in the ATLAS, CMS and ALICE activities for the physics programme at the LHC.

VI. IBR-2 reactor

The Scientific Council takes note of the report “IBR-2 reactor with the new reflector” presented by the Scientific Leader of the IBR-2 Reactor Complex, V. Aksenov. The Council congratulates the staff of the Frank Laboratory of Neutron Physics on the successful completion of the important stage of the reactor’s modernization — the installation of the new movable reflector. It also notes the successful organization of work with IBR-2 users, largely oriented towards experimental research together with member-state scientists, and endorses the programme of condensed matter studies outlined in the report.

VII. Scientific reports

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

“Evidence for the Existence of the Quark-Gluon Plasma at RHIC”,

“Unitarity of the Cabibbo–Kabayashi–Maskawa Matrix and Latest Results of the NA48 experiments”,

“The Facility for Antiproton and Ion Research (FAIR) at GSI”,

“Chemical Identification of Db as a Decay Product of Element 115 in the Reaction

$^{48}\text{Ca}+^{243}\text{Am}$ ".

The Council thanks the speakers Professors T. Hallman, E. Goudzovski, H. Gutbrod, and S. Dmitriev for their informative presentations.

VIII. JINR's prizes

1. The Scientific Council approves the Jury's recommendations on the JINR prizes for 2004 (Appendix 2).

2. The Scientific Council congratulates Professor A.B. McDonald (Queen's University, Kingston, Canada) on being awarded the 2004 B. Pontecorvo Prize, for the demonstration of solar neutrino oscillations in the SNO experiment, and warmly thanks him for his superb presentation.

IX. Next session of the Scientific Council

The 98th session of the Scientific Council will be held on 2–3 June 2005.

V. Kadyshevsky

Chairman of the Scientific Council