I. Preamble

The Chairperson of the PAC, V. Kantser, welcomed the PAC members, the *ex officio* members from JINR, and the members of the JINR Directorate M. Itkis, R. Lednický, and N. Russakovich. The PAC Chairperson presented a short overview of the PAC report delivered at the session of the JINR Scientific Council in September 2009 and information about the implementation of the recommendations of the previous PAC meeting.

JINR Vice-Director M. Itkis informed the PAC about the Resolution of the 106th session of the JINR Scientific Council (September 2009) and the decisions of the JINR Committee of Plenipotentiaries (November 2009). The PAC is pleased to note that most of the recommendations of the previous PAC meeting concerning JINR research in the areas of condensed matter physics have been accepted by the JINR Scientific Council and Directorate.

The PAC took note of the information by A. Ruzaev on the activities related to the International Innovative Nanotechnology Centre for the CIS countries. At its future meetings the PAC looks forward to receiving more information from the JINR Directorate about specific innovative projects that are planned to be implemented at this Centre.

II. Recommendations on the themes to be completed in 2010 and on the proposals for their continuation

"Upgrade of the IBR-2 complex"

The PAC took note of the report presented by A. Vinogradov on the concluding theme "Upgrade of the IBR-2 complex" (04-4-0851-87/2010). The PAC was informed about the work on modernization of the IBR-2 reactor accomplished during 2009 and is pleased to note that this work was proceeding in accordance with the technical and financial plans.

The PAC took note of the report presented by A. Belushkin about the proposal of a new theme: "Development of the IBR-2M reactor with a complex of cryogenic neutron moderators" for the period 2011–2013. The PAC highly appreciates the main tasks of the theme which are to increase the efficiency of using the IBR-2M modernized reactor.

Recommendation 1. The PAC asks the JINR Directorate to monitor the problems related to the delivery of ASCS electronic equipment in order to begin the physical start-up of the reactor timely, in September 2010. The PAC recommends that the JINR Directorate strongly support implementation of the major activities planned for 2010.

Recommendation 2. The PAC recommends completion of the theme "Upgrade of

the IBR-2 complex” (04-4-0851-87/2010) and opening the new theme “Development of the IBR-2M reactor with a complex of cryogenic neutron moderators” for the period 2011–2013 with first priority.

“Information, computer and network support of JINR's activity”

The PAC took note of the report presented by V. Ivanov on the theme “Information, computer and network support of JINR's activity” (05-6-1048-2003/2010) and the proposal for its extension for the period 2011–2013. The PAC notes with satisfaction the significant progress during the reviewed period.

Recommendation. The PAC recommends that LIT present additional information concerning the development of the JINR integrated Network and Unified Grid telecommunication environment in the context of the activities underway at FLNP, FLNR, LRB, and BLTP. The decision about the extension of the theme “Information, computer and network support of JINR's activity” will be taken at the next PAC meeting.

“Mathematical support of experimental and theoretical studies conducted by JINR”

The PAC took note of the report presented by Gh. Adam on the theme “Mathematical support of experimental and theoretical studies conducted by JINR” (05-6-1060-2005/2010) and the proposal for its extension for the period 2011–2013. The PAC notes with satisfaction the increased number of high-quality scientific activities in computational physics, biology, nanotechnologies, and software development in support of studies at JINR Laboratories and Member States’ institutes. The PAC welcomes the efforts taken within this theme towards the development of special software and mathematical methods for highly efficient computations serving the development of the Grid-applied level.

Recommendation. The PAC recommends continuation of the research within the theme "Mathematical support of experimental and theoretical studies conducted by JINR" in the period 2011–2013.

III. Overview of the research of nanosystems at FLNP and FLNR

The PAC was informed by D. Kozlenko about nanoscale physics and nanomaterials research at FLNP, performed by neutron scattering methods and dealing with layered magnetic heterostructures, magnetic fluids, polymers, optically active oxide materials with imbedded nanoclusters, and biological objects.

P. Apel presented to the PAC a report concerning the fabrication and investigation of nanostructured materials using accelerated ion beams at FLNR. Various possibilities for creation of nanostructures using high-energy heavy particles are used: the latent track makes it possible to perform controlled modification of the material; the latent track can be

subject to subsequent chemical treatment leading to formation of the ultimate structure; the etched track nanopores are unique templates which can be filled with various substances.

Recommendation. The PAC appreciates the novelty and significance of nanoscale physics and nanomaterials studies at FLNP and FLNR, which are in line with the topics of the seven-year plan. The PAC recommends continuation of efforts towards upgrading the FLNP and FLNR facilities, oriented to nanoscale physics and nanomaterials studies. The PAC encourages the JINR Directorate to launch a proposal call for research institutes of the JINR Member States in the area of these studies.

IV. Status reports on the modernization of FLNP instruments

The PAC took note of the report presented by Ch. Scheffzuek on the reconstruction of beam line 7A of the IBR-2M reactor for the diffractometers EPSILON-MDS and SKAT.

Recommendation. The PAC supports the FLNP plans to put the new guide system into operation at the start-up of IBR-2M at the end of 2010. The PAC considers the successful test start-up of the diffractometers SCAT/EPSILON-MDS to be the main task for 2010.

The PAC was informed by M. Avdeev about the status of the GRAINS project on the construction of the new multifunctional reflectometer with horizontal sample plane at channel 10 of the IBR-2M reactor. The PAC appreciates the pace of the project realization.

Recommendation. The PAC recommends focusing attention on the necessity to develop the FLNP scientific programme on the liquid-containing interfaces prior to the GRAINS start-up within the framework of the available international collaborations with other neutron centres.

V. Radiation research at LRB

The PAC heard with interest the report “Radiation research at LRB” presented by G. Timoshenko. The LRB specialists have significant experience in the field of radiation protection of high-energy accelerators, and their activity concerning the design of the NICA complex radiation shielding is very important for the successful realization of the project. The PAC appreciates the promising research work connected with the application of nuclear physics methods to the research on the elemental composition of the Solar System planet surfaces, and with biology of living systems of various levels from cells to tissue and body as a whole.

Recommendation. The PAC supports the project of a special beam channel at the modernized Nuclotron for medical and radiobiological experiments with intermediate-

energy heavy ions and recommends that the JINR Directorate find the possibility to realize this proposal.

VI. Scientific reports

The PAC heard with interest the scientific reports on physical and biological themes: “Combined action of ultraviolet (UV-B) and γ-radiation as an escalating risk factor for cataract formation in mice” presented by K. Muranov, “First-principle simulations of structure and properties of metallic glasses” presented by V. Kazimirov, “The Casimir effect for existing and new materials” presented by I. Pirozhenko, “Complementarity of neutron and synchrotron research” presented by Ch. Vettier. The PAC notes the high level of the reports and looks forward to hearing new scientific results of JINR researchers at its future meetings. The PAC especially notes the impressive report by Ch. Vettier.

Recommendation. The PAC recommends that FLNP present at its next meeting an analytical review of the future directions of the development of the neutron scattering technique for the next 10 years at the IBR-2M reactor taking into account the competitiveness and complementarity with synchrotron radiation sources.

VII. Information about scientific meetings

The PAC heard the information presented by N. Ryabova about the II Advanced Courses for CIS countries “Synchrotron and Neutron Studies of Nanosystems (SYN-nano-2009)” (29 June – 30 July 2009, Dubna–Moscow). The PAC was impressed by the Advanced Courses scientific programme which reflected the present status and future possibilities of synchrotron and neutron facilities in nanoscale physics and nanomaterials studies.

The PAC took note of the information presented by A. Khokhryakov about the all-Russian scientific school for youth "Modern Neutronography: Interdisciplinary Studies of Nanosystems and Materials" (12–20 October 2009, Dubna). The PAC noted that the School programme allowed highlighting a number of key research fields and giving young people a vision of the contemporary studies of nanomaterials, nanotechnology, condensed matter physics, and related areas.

Recommendation. The PAC recommends further regular holding of the CIS Advanced Training Courses “Synchrotron and Neutron Studies of Nanosystems” and of the scientific school for young scientists "Modern Neutronography: Interdisciplinary Studies of Nanosystems and Materials".

VIII. Poster presentations

The PAC was pleased with the poster presentations by scientists from FLNP, FLNR, and BLTP in the fields of physics, nanotechnology, and with the concluding report by T. Tropin. The PAC recommends that the best poster presentation be selected by the PAC members at its future meetings.

IX. Miscellaneous

The PAC members highly appreciated the visit to the IBR-2 reactor and the explanations given by A. Vinogradov on the ongoing modernization of the reactor, and recommends continuation in the future of the positive practice of visiting JINR facilities.

X. Next meeting of the PAC

The next meeting of the PAC for Condensed Matter Physics will be held on 24–25 June 2010.

Its tentative agenda will include:

- Information by the PAC Chairperson on the report at the JINR Scientific Council session, and the implementation of the recommendations of the current PAC meeting
- Information by the JINR Directorate on the sessions of the Scientific Council (February 2010) and of the Committee of Plenipotentiaries (March 2010)
- Information from LIT concerning development of the JINR integrated Network and Unified Grid telecommunication environment with research institutes of the JINR Member States
- Overview of the joint investigations at FLNP, FLNR, LRB, and BLTP and at research institutes of the JINR Member States in the area of nanoscale physics and nanomaterials
- Reports and recommendations on the projects and themes to be completed in 2010 and consideration of new proposals and themes
- Status of modernization of the IBR-2 reactor
- Status reports on the modernization of FLNP instruments
- Scientific reports
- Poster session.

V. Kantser
Chairperson of the PAC