

# **Programme Advisory Committee for Condensed Matter Physics**

**49th meeting, 24–25 January 2019**

## **Recommendations**

### **I. Preamble**

The Chairman of the PAC, D. L. Nagy, presented an overview of the implementation of the recommendations concerning JINR research in the areas of condensed matter physics taken at the previous PAC meeting. The PAC is pleased to note that these recommendations have been accepted by the Scientific Council and the Directorate of JINR.

JINR Vice-Director B. Sharkov informed the PAC about the Resolution of the 124th session of the JINR Scientific Council (September 2018) and the decisions of the JINR Committee of Plenipotentiaries (November 2018).

### **II. IBR-2 status report**

The PAC was informed by V. Shvetsov on the current state of the IBR-2 facility as well as on the results of theoretical and experimental studies of the reactor's dynamical characteristics. The PAC appreciates the comprehensive analysis of the technical conditions of the IBR-2 facility and FLNP's plans for its maintenance and upgrade.

Recommendation. The PAC supports the efforts of the FLNP Directorate to secure the operational conditions of IBR-2.

### **III. Scientific results in condensed matter research and instrumentation developments at IBR-2 in 2018**

The PAC was informed by D. Kozlenko about the main scientific results in condensed matter research and instrumentation developments at the IBR-2 reactor obtained in 2018. The PAC appreciates the high scientific level of the results obtained at IBR-2 instruments and their interdisciplinary character.

Recommendation. The PAC encourages the continuous upgrade of the IBR-2 instruments, which will enable extension of the research areas and opportunities provided for the IBR-2 user community. The PAC also expects critical evaluation of each particular instrument and potential for improvement to be presented at the next meeting of the PAC. Furthermore, scientific results and instrumental developments should be presented in terms of this critical analysis.

#### **IV. FLNP's User Programme**

The PAC took note of the report presented by D. Chudoba on FLNP's User Programme statistics for year 2018 and on the implementation of a new web application intended for the collection and evaluation of research proposals. The PAC is pleased to note that the IBR-2 facility has been operating stably according to the User Policy Programme since 2012 with calls for proposals being issued twice a year. In 2018, due to technical reasons at the reactor, less than originally scheduled number of cycles were assigned for experiments within the User Programme.

Recommendation. The PAC recommends making detailed statistics and its analysis for each particular instrument with relation to the FLNP User Programme.

#### **V. Current state of the FSD diffractometer**

The PAC took note of the report by G. Bokuchava about the current state of the FSD Fourier stress diffractometer at Beamline 11A of the IBR-2 facility. The PAC considers FLNP's achievements in developing correlation diffractometry as particularly successful for IBR-2.

Recommendation. The PAC will welcome further suggestions for potential improvements of the FSD diffractometer.

#### **VI. JINR's facility for structural research at the SOLARIS National Synchrotron Radiation Centre of the Jagiellonian University (Kraków, Poland)**

The PAC heard with interest the developments regarding the joint facility for structural research using synchrotron X-rays presented by N. Kučerka. These JINR-SOLARIS collaborative efforts will extend the variety of experimental approaches to the condensed matter research at JINR.

Recommendation. The PAC expects more technical details based on potential scientific use of the proposed facility and, furthermore, interaction with the infrastructure of the SOLARIS laboratory has to be explained.

#### **VII. Proposals of new themes**

The PAC took note of the intent to open new themes "Development of the critical design report for a new Dubna Neutron Source (DNS-IV)" and "Construction of the Laboratory for Structural Research of Macromolecules and New Materials at the SOLARIS National Synchrotron Radiation Centre of the Jagiellonian University (Kraków, Poland)", presented by V. Shvetsov.

Recommendation. The PAC finds this intent timely and recommends that full proposals on these themes be submitted for consideration at the next meeting of the PAC.

### **VIII. Concept for a new neutron source at JINR**

The PAC heard a series of reports in connection with the development of a general concept for a new source of neutrons at JINR.

The PAC appreciated the report on instrumentation and moderators at long-pulse neutron sources presented by F. Mezei, providing a comprehensive analysis of main parameters of existing neutron sources and their instruments with the focus on ESS.

The PAC heard with interest the reports presented by A. Balagurov and A. Ioffe covering the present state and trends in the development of a concept for JINR's new neutron source following its discussion by the Working Subgroup (WSG) on Condensed Matter and Neutron Nuclear Physics of the Working Group for the preparation of JINR's strategic long-range development plan. The PAC notes the progress in developing the conceptual research stage and welcomes the two proposals recommended by the WSG: the pulsed fast reactor IBR-3 (NEPTUN) and the pulsed neutron source driven by a proton accelerator. The PAC is pleased with the WSG's activity to work out recommendations about the next stage of the concept development, which is going to be a technical study.

Recommendation. The PAC expects additional details on the proposals for the source already made. In addition, it looks forward to a detailed proposal for an instrumental suite based on the scientific case.

### **IX. Scientific reports**

The PAC heard with interest the scientific reports "Structure and properties of aqueous solutions of C<sub>60</sub> and C<sub>70</sub> fullerenes for biological applications", "Structural and functional properties of mutant NMDA synaptic receptors", and "CPT study of the Fermi surface reconstruction in the t-J model", and thanks the speakers E. Kyzyma, E. Dushanov, and I. Ivantsov, respectively.

Recommendation. The PAC expects that the presentation level of reports be considerably improved; this comment concerns the speakers of two latter talks.

### **X. Information about scientific meetings**

The PAC took note of the report about the Conference on Neutron Scattering in Condensed Matter (NSCM-2018) (Saint Petersburg, 17–21 September 2018) presented by M. Avdeev. The PAC appreciates JINR's participation as co-organizer of the conference

and notes the wide range of discussed problems as well as the international character of this meeting.

Recommendation. The PAC supports further activities related to the NSCM Conference and participation of JINR scientists in it.

The PAC was informed by A. Rogachev about the International Conference "Biomembranes – 2018" (Moscow, 1–5 October 2018), which was organized in partnership with JINR.

Recommendation. The PAC welcomes the interdisciplinary knowledge exchange provided by the Conference in recent advances of modern integrated structural biology of biomembranes and membrane proteins, theoretical biophysics of membrane systems, and computer modelling.

The PAC took note of the information about the International Conference "Modern Problems of Space Radiobiology and Astrobiology" (Dubna, 17–19 October 2018) presented by V. Chausov.

## **XI. Poster presentations**

The PAC reviewed 16 poster presentations by young scientists in fields of condensed matter physics. The poster "Clusterization aspects of fullerene C<sub>70</sub> in toluene/N-methyl-2-pyrrolidone mixture according to SANS, SAXS and DLS data" by T. Nagorna was selected as the best poster at the session. The PAC also noted two other high-quality posters: "Investigation of crystal and magnetic structure of nanostructured complex oxides of transition metals in wide temperature range" by N. Belozerova and "Isotope-identifying neutron reflectometry at the pulsed neutron reactor IBR-2" by V. Zhaketov. The authors of these posters will receive diplomas at the next meeting.

Recommendation. The PAC recommends the poster "Clusterization aspects of fullerene C<sub>70</sub> in toluene/N-methyl-2-pyrrolidone mixture according to SANS, SAXS and DLS data" to be reported at the session of the Scientific Council in February 2019.

## **XII. Visit to FLNR**

The PAC thanks the Directorates of JINR and Flerov Laboratory of Nuclear Reactions for the organization of the visit to this Laboratory.

## **XIII. Next meeting of the PAC**

The next meeting of the PAC for Condensed Matter Physics will be held on 17–18 June 2019.

Its tentative agenda will include:

- information by the PAC Chairman on the implementation of the recommendations of the current PAC meeting;
- information by the JINR Directorate on the sessions of the Scientific Council (February 2019) and of the Committee of Plenipotentiaries (March 2019);
- reports and recommendations on themes and projects to be completed in 2019;
- progress in the development of a concept for JINR's new neutron source;
- status reports on upgrades of FLNP instruments in the context of the JINR Seven-year plan;
- information on the progress of the SOLCRYS activity;
- information on the progress of the activity of the Working Subgroup on Radiobiology and Astrobiology for the preparation of JINR's strategic long-range plan;
- information about scientific meetings;
- scientific reports;
- poster session.



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Chairman of the PAC  
for Condensed Matter Physics



O. Belov

Scientific Secretary of the PAC  
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