I. Preamble

The Programme Advisory Committee for Particle Physics takes note of the information presented by JINR Vice-Director R. Lednický on the Resolution of the 124th session of the JINR Scientific Council (September 2018) and on the decisions of the JINR Committee of Plenipotentiaries (November 2018).

The PAC is pleased to note that all recommendations of its previous meeting have been accepted by the JINR Scientific Council and Directorate. In particular, the Scientific Council:

– appreciated the progress towards realization of the Nuclotron-NICA project, noting the successful operation of the KRION-6T heavy-ion source and significant improvements in the quality of the beam structure, while encouraging the accelerator team to further improve the emittance of the extracted beam. The Scientific Council acknowledged the progress achieved in the civil construction of the NICA collider complex and in various other areas of this flagship project;

– congratulated the NICA management for organizing the First Collaboration Meeting of the MPD and BM@N experiments. The Scientific Council endorsed the clear road map developed at this meeting for the establishment of the structure and management teams of the MPD and BM@N Collaborations and supported the JINR management's efforts to secure funding for NICA collaborators;

– appreciated the ongoing collaborative efforts to prepare the technical design reports for the MPD subsystems. The Scientific Council urged the MPD team to finalize the ECAL TDR, including results of simulation for the recently adopted projective geometry, and to develop a detailed scenario for the timely construction and commissioning of the ECAL;

– seconded the PAC's recommendations, encouraging the BM@N team to concentrate on the analysis of the large sample of experimental data collected in the recent Nuclotron run with argon and krypton beams and on the completion of the detector configuration, including the installation of a vacuum pipe through the experimental set-up. It also congratulated the Collaboration for the first measurements of short-range correlations in carbon nuclei using reverse kinematics in the BM@N set-up.

The Scientific Council supported the PAC's recommendations on the approval of new projects and on the continuation of ongoing projects in particle physics within the suggested time scales, as outlined in the PAC's recommendations.

The Scientific Council welcomed the decision taken by the PACs for Particle Physics and for Nuclear Physics to hold a joint session on neutrino physics and dark matter research on 22 January 2019.

II. Reports on the Nuclotron-NICA project

The PAC is concerned by the series of delays (mainly in the Booster installation and in civil construction), which affect the overall schedule of the NICA project. The PAC urges the NICA management to critically scrutinize the current schedule of the entire project to ensure that it stands on solid ground and that no further delays occur.

The PAC takes note of the report on the progress towards realization of the Nuclotron-NICA project presented by S. Kostromin, including the progress in developing the accelerator complex. The PAC supports intensification of the efforts to develop the NICA collider equipment and encourages close cooperation and coordination between the accelerator and detector teams.

The PAC heard with interest the report presented by N. Agapov on the development of the VBLHEP infrastructure, including the Nuclotron. The PAC is pleased to note the successful implementation of the plan for the renewal of heating, water and drainage networks. As of today, 12 km of networks have already been renewed (2 km since the previous PAC meeting), and this work is expected to be completed by the end of the year. The PAC welcomes the efforts of the Laboratory’s management to eliminate the backlog from the plans to build a compressor station and wishes success in finding a new reliable contractor for this project.

The PAC is pleased with the presentation by V. Kekelidze about the 2nd Collaboration meeting of the MPD and BM@N experiments. The PAC welcomes the establishment of official international collaborations and the admission of new institutions to the collaborations. The PAC congratulates the elected Spokespersons and Institutional Board Chairpersons, the appointed Project Managers and Deputy Spokespersons, and wishes them all very fruitful work at the NICA facility.

The PAC heard with interest the report on the progress towards realization of the MPD project presented by A. Kisiel, the elected Spokesperson of the MPD collaboration. The PAC notes the steady progress in constructing the main subsystems of the MPD facility: the superconducting magnet, TPC and ToF. The PAC welcomes the award of a special-purpose joint grant of the Russian Federation and the People’s Republic of China for construction of the MPD ECal detector. The PAC supports the

plans for the formation of management and organizational structures of the collaboration.

The PAC heard with interest the report on the progress towards realization of the BM@N project presented by M. Kapishin, the elected Spokesperson of the BM@N collaboration. The PAC heard the preliminary results about the detector performance in the 55th run of the Nuclotron and urges the BM@N team to focus efforts on the physics analysis of the large data sets collected both in the BM@N research programme and in the study of short-range correlations. The Committee reiterates its request to see physics analysis reports at the next meeting. The PAC supports the plans for the installation of the BM@N transport line and the vacuum beam pipe though the experimental set-up, which are necessary for operation with heavy-ion beams, and urges the BM@N team to coordinate these plans with the accelerator team.

III. Proposal of a new project

The PAC heard with interest the proposal presented by R. Tsenov for opening an official project for the preparation of a Conceptual Design Report (CDR) for the Spin Physics Detector (SPD) at the NICA collider, followed after its acceptance by a Technical Design Report. The current concept presented to the PAC does not look very convincing. The CDR must contain a full concept (allowing for optional technical solutions) with clear physics goals and simulations showing the physics performance targeted. The concept should guarantee much better spin physics results than those that could be achieved with MPD at NICA in order to justify the needed important investment to realize SPD. Once the CDR is presented within one year and approved by the PAC, the Technical Design Report is expected to be prepared within the following two years. Technical solutions should be of latest state-of-the-art and should not necessarily be based on in-house existing technologies. The PAC encourages the full SPD Collaboration to be involved in the concept elaboration process. A dedicated core of people is needed in order to achieve the task. The PAC recommends approval of the project of preparation of the CDR and TDR until the end of 2021 with first priority.

IV. Reports on projects approved for completion in 2019 and proposed for continuation

The PAC takes note of the report on JINR's participation in the BES-III project, presented by A. Zhemchugov. The BES-III experiment is focused on studies of charmonium physics, physics of charmed mesons, τ-leptons and light-hadron

spectroscopy in the energy range of 2-4.6 GeV at the BEPCII e^-e^+collider at the Institute of High Energy Physics in Beijing (China). The PAC appreciates the many significant contributions in software development and data analysis and the results obtained by the JINR group in the BES-III experiment since 2005. The PAC notes that the experiment has reached most of its goals and considers that further studies could be conducted by the proponents with a commensurate lower effort. For these reasons the PAC recommends continuation of this activity until the end of 2022 with second priority.

The PAC takes note of the report on JINR's participation in the R&D project for the ALICE photon spectrometer, presented by A. Vodopyanov. The project is aimed at improving the performance and reliability of the PHOS detector. A number of tests performed with electron beams at CERN with different SiPMs have shown that 500 ps time resolution is achievable at ambient temperatures. The pre-production prototype of 32-channel readout card (FEC-32) compatible with the ALICE DCS and DAQ systems will be developed and tested during 2019–2020, with complete documentation for the mass production. The PAC recommends continuation of JINR's participation in the R&D project for the ALICE photon spectrometer upgrade until the end of 2020 with first priority.

V. Reports on the scientific results obtained by the JINR groups in the LHC experiments

The PAC takes note of the new results obtained by the JINR group in the ALICE experiment, presented by B. Batyunya. The PAC appreciates the progress of the JINR group in the study of kaon femtoscopy in Pb-Pb, p-Pb and pp collisions and the new results in the analysis of ultraperipheral Pb+Pb and p-Pb collisions obtained in Run 2 of the LHC.

The PAC takes note of the new results and current activities of the JINR group in the ATLAS experiment, presented by S. Turchikhin. The PAC appreciates the contribution of the JINR group on the following subjects: progress in the mass production of micromegas chambers for the Phase-1 upgrade of the ATLAS Muon Spectrometer, observation of the Higgs boson decay into a pair of *b*-quarks, recent results on searches for new physics in γ+Z/W/H final states, searches for quantum black holes, measurements of the B_c meson excited states, as well as the framework development of the ATLAS distributed data management.

The PAC takes note of the results obtained by the JINR group in the CMS experiment, presented by V. Alexakhin. The PAC appreciates the results of the JINR

group on the search for high-mass resonances decaying into dilepton pairs, the search for microscopic black holes, the measurements of asymmetries and cross-sections of Drell–Yan pair production, and the search for resonances in the mass spectrum of muon pairs produced in association with *b*-quark jets. The Committee is satisfied with the progress in realization of Phase-1 of the detector upgrade and supports the R&D work for a new hadron calorimeter.

VI. Scientific report

The PAC takes note of the report “Description of meson production in electron-positron annihilation and tau-lepton decays within the NJL model” presented by A. Arbuzov and thanks the speaker for the presentation.

VII. Development of JINR’s strategic long-range plans in the area of particle physics

The PAC heard with interest the report concerning the long-range plans for JINR’s development in the area of particle physics presented by N. Russakovich. The PAC highly appreciates the JINR Directorate’s efforts towards defining strategic objectives and establishing priorities in the JINR scientific policies. It also supports JINR’s plans to become integrated, with its projects and facilities, into the European Research Infrastructure and to further enforce partnership relations with CERN.

VIII. Young scientists at JINR

The PAC reviewed 22 poster presentations in particle physics by young scientists from DLNP and VBLHEP. The Committee has selected the poster “East-west asymmetry effect in atmospheric muon flux in the Far Detector of NOvA” presented by O. Petrova to be reported at the session of the Scientific Council in February 2019.

The PAC reiterates its recommendation that the posters should focus on the actual work of the young scientists.

IX. Next meeting of the PAC

The next meeting of the PAC for Particle Physics will be held on 19–20 June 2019.

The following items are proposed to be included in its agenda:

– follow-up on the to-do-list from this PAC meeting;
– consideration of new projects;
– reports and recommendations on the projects to be completed in 2019;

– status report on the Nuclotron-NICA project;
– status report on the MPD project including simulation results;
– status report on infrastructure issues including the Nuclotron;
– report from the Coordinator of the experimental programme with Nuclotron beams;
– report on the BM@N project including simulation results and the new addendum to the physics programme;
– posters from young physicists.

I. Tserruya

Chairman of the PAC
for Particle Physics

A. Cheplakov

Scientific Secretary of the PAC
for Particle Physics