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Date 2019.05.13
Ref. _____

To PAC on CMP, JINR, Dubna, Russia

Review of theme 1119

"Methods, Algorithms and Software for Modeling Physical Systems, Mathematical Processing and Analysis of Experimental Data"

Leaders: Gheorghe Adam, Petr V. Zrelov,
Deputies: Ján Buša, Ochbadrakh Chuluunbaatar
Status: Proposed for extension till the end of 2023

This is a comprehensive well written research proposal the main emphasis of which is to solve difficult mathematical and computational physics problems stemming from research projects defined in JINR and approved for completion during the present Seven Year Plan of JINR Development for 2017–2023.

The existing human resources are of good quality. The perspectives for their development come from the LIT position as an attractor for young talents, both from institutions in the country of residence of JINR and from JINR Member State institutions.

The computer support contributes both to the synergy of the whole scientific research done in the JINR and to the enhancement of the importance of the research done in the frame of theme 1119 concerning the solution of top research matters in computational mathematics and computational physics to advantage of the JINR scientific community. These articulated aspects of the proposal point to the timely nature of the submitted research program.

The foreseen research attempts at using, at their maximum capacity, the already existing top computing facilities developed and maintained in LIT within the Multifunctional Information and Computing Complex (MICC). The proposal foresees the development of modeling methods, algorithms and parallel software packages for high performance computing (HPC) to be done at the heterogeneous HybriLIT computing platform with a threefold purpose: to *learn* different top computing paradigms and techniques, to *test* the newly developed packages at their initial stages (both done at the HybriLIT learning and testing cluster) and to *perform large scale computing experiments* at the "GOVORUN" supercomputer.

I should like to mention that the activity during last three years is very impressive. This is reflected in more than 300 publications in recognized journals, many important results were presented at prestigious international conferences. The organization of the series of periodic international scientific conferences "Mathematical Modeling and Computational Physics" (MMCP) jointly done by LIT JINR in cooperation with partner institutions from JINR Member States and followed by publications of Conference Proceedings in top scientific journal under rigorous refereeing processes is to be specially stressed. The organization of satellite events of MMCP Conferences consisting in tutorials on flagship JINR topics is a big plus of these conferences.

I notice three main points which deserve full support: (1) the successful development of software on the heterogeneous HybriLIT computing platform as the fundamental high performance computing resource of JINR; (2) the new approaches involving Big Data analytics and quantum computing as possible breakthroughs in the solution of the most stringent tasks of the JINR research in the relativistic nuclear physics (NICA) and neutrino physics (BAIKAL GVD); (3) the solution of scientific topics which stay at the basis of the success of specialized JINR projects for the next four year period.

In conclusion, I propose to the CMP-PAC the approval of the extension of theme 1119 during 2020–2023 with the first priority.

May 13, 2019

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