

**Referee's report  
on the JINR participation in the  
Project :  
Search for new physics in the charged lepton sector**

The search for any possible manifestations of physics beyond the Standard Model (BSM) is of great importance both for experiments on colliders and in all other experiments. Not yet observed rare processes with very low probabilities, predicted by the Standard Model (SM), are of particular interest, since any observation of them will be a BSM signal. The processes associated with the violation of the flavor in the sector of charged leptons (cLFV) have very small rates in SM. However, in a number of BSM scenarios, significant enhancement of the corresponding process rates can be expected. Therefore, the search for such processes can lead to a new physical discovery in the case of detection of processes or give severe restrictions on the parameters of a number of BSM scenarios. The most promising effect of cLFV is the muon-electron transition, which is the subject of a search in next-generation experiments on MEG-II, Mu2e and COMET. Processes involving the muon-electron transition, which is a powerful tool for studying BSM physics, are sensitive to new effective physical mass scales of  $10^3$ – $10^4$  TeV, significantly larger than scales that can be directly probed at colliders.

The project “Search for new physics in the sector of charged leptons” reflects the participation of JINR in three experimental programs on MEG-II, Mu2e and COMET.

JINR colleagues have achieved great success in preparing the work of the respective detectors. As clearly indicated in the scientific plans of the project, for the Mu2e experiment, JINR will continue to create a CRV system, conduct electronic tests of the E-cal external interface, create a remote control room, and possibly participate in the assembly and maintenance of the detector; for the MEG-II experiment, JINR provides the operation of the JINR computer cluster, modeling, event mapping, and support for the operation of the drift chamber; for the COMET experiment, JINR will manufacture the entire set of 5 mm straw tubes, take part in the creation of a tracker, calorimeter and CRV system. In all three experiments, JINR colleagues will participate in data analysis. The only small recommendation may be to increase such participation in concrete physical analyses.

In my opinion, the proposed project “Search for new physics in the sector of charged leptons” is very interesting from the point of view of physics. The continued participation of JINR in research physics programs at MEG-II, Mu2e, and COMET is highly desirable. The corresponding three JINR teams have the necessary experience and made a significant contribution. The financial request is duly justified.

Therefore, I recommend the proposed project for a support.

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