

Review of the proposal on “JINR participation in COMET experiment”

The goal of the international project "COMET Experiment" is to search for evidence for the existence of new physics beyond the Standard Model due to lepton flavor violation processes in the muon sector. These processes are sensitive to effective mass scales of the new physics of 10^3 - 10^4 TeV/ c^2 , which is well over the capabilities of direct collider studies. In the near future, planned experiments will begin to obtain data and extend the sensitivity to lepton number violation interactions by orders of magnitude. Experimentally, one of the most promising processes for searching for lepton number violation is the direct conversion of a muon into an electron through interaction with the μ -N \rightarrow e-N nucleus. The COMET experiment is aimed at measuring the neutrinoless coherent muon-to-electron transition ($\mu\rightarrow e$ conversion) in the field of the aluminum nucleus.

The presented project is well structured: a full description of the physical problem, including a detailed description of the setup and expected results, comprehensive simulation of the calorimeter and straw tracking is given. Special simulations have been performed to optimize the J-PARC main ring to achieve a very low attenuation factor, below 10^{-9} , which is mandatory for COMET. This requires a large amount of computational power. In the project the interaction with JINR MLIT and the resource requirements of MIVC are discussed in details.

The successful participation of JINR scientists in the COMET project has a long record. They fabricated and tested all 9.8-mm straw tubes for the first phase of the detector construction and all 5-mm straw tubes for the second phase. The JINR group has made significant contributions to the simulation and development of various detector systems, including the Straw Tracker, the Electromagnetic Calorimeter, and the Cosmic Ray Veto (CRV) system.

In addition, the group was elected as the coordinator of the production of the straw tracker system, its testing and assembly. JINR also assumed full responsibility for the development and optimization of the crystal calibration method for the calorimeter to be used in COMET phases I and II, for the assembly, testing, installation and operation of the calorimeter, and for the certification of the crystals, while leading the research work.

Most of the investments in the project implementation have already been made and the resources requested to fulfill the commitments are adequate.

I fully support JINR participation in the COMET experiment for 2024-2026.



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