Referee review

of the proposal for continuation of the JINR participation
in the COMET experiment

Searches for new physics beyond the Standard Model will dominate in particle physics for decays. The physics motivation of the COMET experiment is well known. Flavor transitions between the charged leptons in the processes like $\mu \rightarrow e\gamma$, $\mu \rightarrow$ eee and $\mu + N(A,Z) \rightarrow e + N(A,Z)$ are addressed by the COMET experiment. The detector will operate at JPARC accelerator in Japan, aimed to reach a single event sensitivity (SES) of about 10^{-17}. The experiment will be staged in Phase-I and Phase-II periods. The goal of Phase-I is to study muon beam contamination and to reach SES at the level of 10^{-15}.

The JINR participation in the construction of two major components of the COMET detector - electromagnetic calorimeter and straw tracker - was approved by the JINR PAC for Nuclear Physics in 2014. Team members are also actively participate in the detector simulation program. Since approval of the project a number of important results have been achieved.

A dedicated test bench has been constructed at DLNP JINR to measure parameters of the scintillating crystals for the electromagnetic calorimeter. It is supposed that all LYSO crystals chosen by the COMET collaboration for the electromagnetic calorimeter will be tested and certified at this setup.

The DLNP JINR group is the only group in COMET collaboration bearing responsibility for manufacturing of all straw tubes for both phases of the experiment. It is worth to note that a set of more than 2500 tubes of 120 cm and 160 cm length, 9.8 mm diameter and 20 μm wall thicknesses, has been produced, tested and delivered to Japan to be used in the Phase-I set-up. The job was done at the dedicated production area at VBLHEP by the COMET team members. A similar production area must be created at DLNP for manufacturing of thinner straw tubes for COMET Phase-II setup. The task is not trivial and a lot of R&D work is required to achieve high quality of the regular welding processes. It is very important to keep momentum and provide an adequate support in order to get the new technology in the Laboratory and ensure in-time start of the mass-production.

Development of the straw tracker and calorimeter required a lot of simulation work performed at JINR and included in the Technical Design Report for Phase-I of the COMET. This work has already started and important results are achieved for performance parameters of the different straw tubes and calorimeter crystals. The JINR authors of the project are planning to extend the scope of their activities in order to continue the physics analysis of the data at JINR. I suggest that this should be treated as a high priority task for the team and a necessary condition of the JINR participation in the COMET.

The requested budget of the project will be spent on the R&D work and site development for the straw tubes mass-production, a big part of expenses is the cost of LYSO crystals. The numbers presented in the proposed budget are reasonable.

In conclusion, I consider the project as a good example of inter-laboratory work at the JINR and recommend to approve continuation of the JINR participation in the COMET experiment for the period of 2017-2019.

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