**Opponent review**

**on proposal for the prolongation of the project**

**≪THE PRECISION LASER METROLOGY FOR ACCELERATORS AND DETECTOR COMPLEXES≫**

Prolongation of the Project “The Precision Laser Metrology for Accelerators and Detector Complexes” represents the next necessary step for the development of new generation of metrology instrumentation for the large-scale research complexes like LHC with ATLAS, CMS, and ALICE – spectrometers. This activity is a necessary part of modern high-energy physics as far as it aimed on increasing of collider experiments accuracy, increasing the LHC capabilities and particularly increasing of luminosity.

The first part of the Project proposes the creation of NETWORK of six Precision Laser Inclinometer for the visualization of the Earth surface deformation caused by seismic waves. This range of problems is presented in scientific literature that indicate the relevance of problem in physics. Transition to the practical side is necessary and natural phase. Using the fact that authors come far in the region of precision inclinometer the extension of application of JINR PLI PROJECT is a step of fundamental importance.

The second part of the Project is a further development of proposed Interferometric Distance Meter. Using of high-frequency amplitude modulation in the distance measuring is a well-known “technical path”. The authors suggest a creation of such interferometer that allow reducing the dependence from the environment parameters. This opportunity is extremely interesting from the point of reducing the impact of interferometer's quality settings on measurement accuracy. The authors do not give the expected measurement accuracy of proposed instrument.

The third part explored the possibility of creating of Laser Fiducial Line in the new Metrological Laboratory in DLNP. The multiplication of optical path with a step of 22 meters uses in this part of Project. The authors emphasize it is necessary for the methodical R&D on definition of LFL characteristics in the conditions of seismic isolation of the LFL components. I want to advice the authors to carry out the research in a full length, moreover, such an opportunity exists in JINR.

In the fourth part, authors suggest a creation of seismically isolated by angle the researcher platform based on JINR PLI. Actually, using the feedback system on a piezoelectric actuator it is possible to stabilize the researcher platform surface from the angular oscillations. In confirmation of possibility of the Project, I would say about the existence of adaptive mirror-correcting system for large telescopes.

I also would like to add that except to angular oscillations also exists the linear displacement of the Earth's surface in plane and in height. For more complete system of seismically stabilization, the registration of these movements is also required. But since angular oscillations have not been taken into account before the creation of JINR’s Precision Laser Inclinometer the proposal of authors is highly important and interesting in physics and technical aspect.

The authors indicate the main purpose of researches: the creation of robotic metrological complex. On my mind, such complex will be extremely useful for the Dubna collider NICA.

In connection with above, I support the prolongation of the Project as a first priority research in JINR Topical Plan 2019-2021 y.y.

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