

"ATLAS. Upgrade of the detector and physics research at LHC"

The ATLAS facility is a large-scale general-purpose detector currently operating at the LHC and designed to implement an ambitious physics program of measuring many SM parameters and searching for manifestations of new physics beyond the SM. The implementation of the research program requires the accumulation of large statistics and a radical improvement in the operation of subsystems in terms of radiation resistance, spatial and temporal synchronization of event registration and powerful triggers.

In previous years, a large volume of research and studies has been carried out at JINR with a decisive contribution to the physical results obtained by the Collaboration. JINR employees are actively involved in improving the characteristics of several subsystems of the ATLAS setup, making a significant contribution to the modernization of the muon spectrometer and liquid argon calorimeter. When improving the parameters of the muon spectrometer and creating its new subsystem, JINR mastered the modern Micromegas technology.

To meet the stringent conditions at the HL-LHC, the ATLAS Collaboration is upgrading its subsystems with state-of-the-art instruments and technologies in the Phase-2 upgrade programme. Key improvements include changes to the trigger and data acquisition system, a completely new all-silicon internal tracker, a new silicon timing detector, as well as upgrades of the calorimeter electronics and the installation of additional muon chambers and electronics. In 2019, JINR signed the Memorandums of Understanding on Cooperation in the ATLAS Detector Upgrade (Phase-2 Upgrade), which define the obligations of the JINR team to participate in the upgrade of the muon spectrometer (development and fabrication of resistive flat chambers RPC), the liquid argon calorimeter and the construction of the high granularity timing detector HGTD. At present, several methodological studies of the characteristics of the above subsystems have been carried out, prototypes have been manufactured and are being tested.

Participation in the NICA project at JINR is separately mentioned, where work is underway to improve the TPC for the MPD and to build a Micromegas-based tracker for the SPD detector.

The requested financial expenses are in line with the Seven-Year Plan for the Development of JINR in 2024-2030. The associated risks presented in the SWOT analysis are reasonable and require rejuvenation in the group of project participants. In general, the project presents a well-balanced action plan with clearly defined responsibilities of the JINR team on key aspects of participation in the ATLAS modernization program.

Based on the above, I recommend continued participation of the JINR team in the upgrade of the ATLAS facility over the next 5 years.



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