



# ЛАБОРАТОРИЯ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ

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**конференц-зал**

**Семинар совместно с Лабораторией ядерных проблем**

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## **TRIGGER AND DATA ACQUISITION FOR THE ATLAS EXPERIMENT: CONCEPT, DESIGN AND REALISATION**

### *Abstract*

*ATLAS (A Toroidal LHC ApparatuS) is a multi-purpose detector presently under construction for the Large Hadron Collider (LHC) at CERN. The selection of interesting physics channels and the acquisition of their data requires a Trigger and Data Acquisition system (TDAQ) based on innovative architectural solutions and a multi-level selection process and a hierarchical acquisition tree, expected to provide an online selection power of  $10^5$  and a total throughput in the range of Terabit/sec. Its implementation consists of a combination of custom electronics and commercial products from the computing and telecommunication industry.*

*The concept and design of the ATLAS TDAQ have been developed to take maximum advantage of the physics nature of very high-energy hadron interactions. The final system will consist of a few thousands processors, the majority commercial PCs, interconnected by a multi-layer Gbit Ethernet network, whose central core consists of two 256-port switches. The selection and data acquisition software has been designed in-house and production releases are regularly produced and extensively used for the operations at the ATLAS experimental site and in ATLAS laboratories and institutions worldwide.*

*The installation and commissioning of the ATLAS TDAQ system is well advanced. The networking and online computing infrastructure is complete. The totality of the Read-Out System is installed since Summer 2006 and routinely used by the sub-detectors. 1/3 of the dataflow network and computing nodes is installed and will be completed by the end of the year. A minimal number, ~160 nodes, of High-Level Trigger processing unit are installed and operational, the bulk of the processing power will be purchased as close as possible to LHC start-up.*

*The totality of the installed system is today operational and routinely used in real-life data taking sessions for the commissioning of the TDAQ system (TDAQ Technical Runs) and the commissioning of the full ATLAS experiment (Commissioning Runs). The former use physics selection algorithms in the HLT farms on simulated data pre-loaded in the Read-Out System, while the latter take cosmic data through the detectors after final integration in the TDAQ system. The ATLAS data taking is today well advanced, showing a performance adequate for the final data taking at the LHC.*