

Integrated Data Acquisition, Storage and Retrieval for Glass Spherical Tokamak (GLAST)

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GLAST is a series of small spherical tokamaks with an insulating vacuum vessel of major and minor radius of 20 and 10 cm respectively (for GLAST III). It is installed in NTFP, Islamabad, Pakistan. The purpose of these experiments is to understand different aspects of tokamak operation such as startup phase and then sustaining tokamak plasma for a sufficiently long time. In case of a nonmetallic chamber, plasma is prone to many instabilities due to absence of passive stabilization which is only provided by metallic chamber of tokamak. In this situation, measurement and correction of various type of currents and magnetic fields responsible for plasma generation becomes very important. An efficient data acquisition system serves the purpose of acquiring the raw data from all diagnostics ranging from magnetic diagnostics to plasma diagnostics and storing this raw data for post processing by different connected users.

The data acquisition (DAQ) system of this tokamak is in evolving process and is built from scratch. It integrates different data sources as an assortment of data acquisition hardware and software. It is based on the novel data acquisition technology using National Instruments' data acquisition cards. This paper presents the evolution of the hardware setup and software implementations of the DAQ system for GLAST tokamak. This system includes all the sub-systems required for successful acquisition of a signal from the transducer to the DAQ hardware and then to database. The hardware for the DAQ system comprises of National Instruments USB DAQ Cards, i.e., NI6363 USB X series. The software layer for front and back end handling is developed using LabView and Matlab for acquisition, storage, data retrieval and post processing purpose. The main features of the systems include system configuration, shot implementation, data saving and data sharing between the connected users. In addition to the evolution of DAQ system, future directions about control system of GLAST tokamak experiments has also been highlighted.

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