DIAMOND DETECTOR MEASUREMENT CHANNEL DATA ACQUISITION AND PROCESSING SYSTEM DEVELOPMENT [[1]](#footnote-1)\*)

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Each diagnostic of the ITER machine has its own data acquisition and control system. One of the key functions of these systems is stream data processing. Such systems should meet a range of requirements, including the following: all information issued from the process shall be supplied with an identifier, a time stamp, and a quality flag including error identification in case of error, etc. An example of a project that meets these requirements is presented in this study.

Diamond detectors are widely used for fast neutrons registration. Their application as VNC detectors is caused by their ability to work reliably in harsh ITER environments, especially by their high radiation hardness (they withstand a neutron fluence of up to 1014 – 1015 1/cm2). It should be taken into consideration that the directly measured neutron signal always contains a scattered neutron component. In real experiments diamond detectors can also detect gamma radiation background. This necessitates the creation of algorithms that can extract the required information from the signal, i.e. the counting rate in counter mode and the neutron energy spectrum in spectrometer mode.

The data acquisition system used in this project is a heterogeneous device, comprised of an industrial computer and a fast ADC coupled to a high-speed I/O board with data processing capabilities provided by an on-board reconfigurable FPGA. In this study we give an overview of the approaches used to develop a real-time signal processing algorithm for acquiring the amplitude spectrum of registered pulses.

One of the important challenges developers of control systems are faced with is integration of their equipment into the SCADA system. In our case, the SCADA system is the EPICS and for integration purposes ITER provides a special software tool - Nominal Device Support v3. It was created to simplify the support of data acquisition, image processing and time synchronization devices. In this report we present an example of Nominal Device Support v3 being used to develop support for the hardware of the measurement channel.

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVIII/E/ru/IC-Guzhev.docx) [↑](#footnote-ref-1)