Experience in the use of modern hardware and software for ONLINE processing of scientific data from the DIAGNOSTICS SYSTEMS in FUSION EXPERIMENTS [[1]](#footnote-1)\*)

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Nagornyi N.V., Zvonareva A.A., Mironov A.Yu., Mironova E.Yu., Zhuravlev M.K., Guzhev D.I., Nikolaev A.I., Nesterenko V.M., Portone S.S.

Institution «Project Center ITER», [support@iterrf.ru](mailto:support@iterrf.ru)

Experimental studies of physical processes today are carried out using a large number of different physical installations, ranging from small laboratory stands to mega-science projects. Each project involves the acquisition of scientific data during the experiment, and the more complex the installation and the physical process under study, the more important the relationship between the control of the experiment and the consideration of the results of the analysis obtained during the experiment of scientific data.

Analysis of scientific data, which can be understood as working with stored data after an experiment, or considering the results of automatic data processing by control systems during an experiment, is preceded by data acquisition and online data processing at different levels of the hardware and software hierarchy of the measuring system. Such hierarchy may include processing data immediately after the ADC using hard logic, reprogrammable logic integrated circuits and performing data transformations using microcontrollers for subsequent transfer to a computer. Data operations in the operating system of a computer are performed using various hardware resources, such as processor cores, memory, graphics processors, and software. The final processing of the data is carried out at the level of the central control system of the plant. This paper presents the experience of using modern hardware and software to perform online data processing of information coming from the measuring equipment in various diagnostic systems of the fusion experiments and achieve a high feedback rate with the control systems and the experimenter.

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