DEVELOPMENT OF INSTRUMENTATION AND CONTROL SYSTEM FOR NEUTRAL PARTICLE ANALYSERS ON ITER [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2023.50.2023.1.1.245

Mironov M.I., Afanasyev V.I., Melnik A.D., Navolotsky A.S., Nesenevich V.G., Petrov M.P., Petrov S.Ya., Chernyshev F.V., Shmitov R.Yu.

Ioffe Institute, St. Petersburg, Russia, post@mail.ioffe.ru

Neutral particle analysis [1] is one of key ITER diagnostics[2], with focus on fuel ratio measurement and, more generally, on ion distribution functions in keV and MeV energy ranges.

At present, the diagnostics is in process of preparation for the final design review, with an instrumentation and control system being an integral part of it. In this report the results of this work are presented.

The general hardware architecture is given. The results of development of custom electronics are presented. These include preamplifier, signal conditioning units and, also, a control unit for a calibration helium ion source. Accommodation of hardware in cubicles is described.

Considerable progress has been made in development and debugging of FPGA firmware that processes digitized signals coming from detectors. It was shown that the firmware is capable of preliminary filtering of incoming data stream and can adequately forward it from a fast controller to the ITER network. And it was demonstrated that the diagnostics’ hardware can be managed by standard ITER slow controllers.

General instrumentation and control algorithms are described together with a concept of the controlling software and a set of documentation which have to be prepared for the final design review.

References

1. Afanasyev V A, Chernyshev F V, Kislyakov A I, Kozlovski S S, Lyublin B V, Mironov M I, A.D. Melnik, Nesenevich V G, Petrov M P and Petrov S Ya 2010 Neutral Particle analysis on ITER: present status and prospects Nucl. Instr. and Meth. A 621 456-467
2. ITER Physics Basis. Chapter 7, Nucl. Fusion 47 (2007) S337–S384
1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/E/ru/IE-Mironov.docx) [↑](#footnote-ref-1)