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PROGRESS IN ITER VNC DEVELOPMENT ^{*)}

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The paper presents an overview of the ITER Vertical Neutron Camera (VNC) diagnostic. VNC is a multichannel neutron collimator designed to measure spatial distribution of the intensity of neutron source.

VNC development has reached its final stages, with production scheduled to begin in 2024.

A Neutron Analysis of the diagnostic was carried out – the spatial distribution of sources of radiation heating of the VNC structure was calculated, as well as the dynamics of the activity of diagnostic materials and the spatial distribution of the equivalent dose rate. The development of Detection Unit made up of two semiconductor diamond detectors and two ionization fission chambers with a radiator based on ²³⁸U has been completed. The detectors were successfully tested under conditions close to the real operation conditions. The influence of operation conditions on the energy resolution of detectors and their sensitivity to fast neutrons was experimentally determined. Prototypes of the main critical elements of the diagnostic system were made and tested. The development of a VNC data acquisition system, which allows measuring the neutron flux density at the detector in real time with 1 ms resolution over a wide dynamic range, is nearing completion. The effectiveness of the algorithm for reconstructing the profile of a plasma neutron source was tested for different plasma scenarios from the ITER database. An analysis of the shielding of neutron and gamma radiation fields by the shielding cabinet of the VNC pre-amplification electronics was performed.

Based on the results of the work done, one of the final stages of VNC Design Review is scheduled to be carried out in 2024.

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References

- [1]. Bertalot, L. et al., (2015) Concept Design and Integration Aspects of ITER Vertical Neutron Camera // *Proceedings of Science*

^{*)} [abstracts of this report in Russian](#)