DD and DT neutron source profile reconstruction by iter vertical neutron camera [[1]](#footnote-1)\*)

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ITER Vertical Neutron Camera (VNC) is a neutron diagnostic system intended to measure neutron emission profile in poloidal plasma cross-section [1]. VNC consists of two subsystems – Upper VNC located in Upper Diagnostics Port-Plug #18 and Lower VNC located in Lower Port #14. Upper VNC contains 6 collimators, Lower VNC – 5 collimators. At the end of each collimator there is a Detector Unit. Every Detector Unit contains two 238U fission chambers and two diamond detectors of different sensitivity.

We developed an algorithm of simultaneous reconstruction of both DD and DT neutron source profiles from measurements of VNC fission chambers and diamond detectors taking into account a-prior information on the shape of magnetic surfaces. Reconstruction technique of neutron plasma source is based on the variant of maximum likelihood method – EM-algorithm [2]. We performed an analysis of reconstructed neutron source profile sensitivity to the detector statistical errors and magnetic surfaces distortion. We have shown that developed reconstruction technique allows reconstructing neutron source profile with 10% error in both DD and DT plasma experiments.

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References

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2. K. Lange, R. Carson. EM Reconstruction Algorithms for Emission and Transmission Tomography. Journal of Computer Assisted Tomography, 8(2), 1984, 306-316

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