neutronics analysis of iter vertical neutron camera components [[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.

This report presents the results of neutronics analysis of in-vessel components of Lower VNC and the results of modelling of radiation shielding for electronics located in the port cell behind the bioshield.

Neutron flux spatial distribution with 175-group energy binning, signal-to-background ratios for VNC detectors and radiation heating volume distribution were obtained for Lower VNC detector module. The information about neutron energy spectrum distribution allows to perform the activation analysis of VNC structures using FISPACT-II code [2].

The activation calculations allow to build the decay gamma source that is used to perform gamma transport calculations. The spatial distribution of gamma-radiation dose rate around VNC components after extraction from the tokamak is obtained around VNC components after extraction from the tokamak.

The isotropic volumetric source spatially distributed around the shielding cabinet was modelled. Neutron fields were taken from [3]. For absorbed dose calculations gamma sources of 60Co и 16N radioisotopes were modelled. They are born due steel and water activation respectively.

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References

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