Study of the D-D neutron generator in application to the ITER neutron diagnostics calibration [[1]](#footnote-1)\*)

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Current research focuses on the D-D neutron generator study in the view of utilization of these sources during the ITER neutron diagnostics *in situ* calibration campaigns. The results of anisotropy analysis in terms of both yield and energy distribution are presented using the ING-07D neutron generator as an example.

We conducted the GEANT4-modelling [1] of the LaCl3(Ce) scintillation detector response to the neutron source. Parameters of the neutron source were selected in accordance with the realistic ING-07D operating regime. We performed the comparative analysis of the experimentally obtained detector responses and the modelled ones [2]. The digital pulse-shape discrimination method was applied allowing the in-depth analysis of only the neutron-induced LaCl3(Ce) response part [3].

Results of this analysis allowed us to infer the ING-07D ion beam composition. Specific features of the neutron energy distribution are to be considered during the ITER in-vessel neutron calibration campaign employing this type of neutron generators.

Based on the experimental data we were able to estimate the D-D neutron generator directional properties in terms of yield, several operational parameters to be controlled during calibration campaigns were identified. Additional study was conducted featuring the long-term stability of the neutron generator yield.

The D-D neutron generator type in scope of current research is shown to be the optimal solution to the task of the ITER in-vessel neutron diagnostics calibration. The LaCl3(Ce) scintillation detector is deemed suitable for the purposes of D-D neutron generator yield and spectrum monitoring.

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References

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