GENERATION OF NARROWLY focusED RADIATION OF NEUTRONS IN A PLASMA-FOCUS DISCHARGE - DISCOVERY AND PROSPECTS OF RESEARCH [[1]](#footnote-1)\*)

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The results of processing of time dependences of the signals from the scintillation detectors under conditions of measurements in a confined space and modeling of these time dependences by a Monte Carlo method indicate the presence in the plasma focus discharge of a special process of generation of a neutron beam narrowly directed along the axis of the plasma focus device, complementing two well-known processes - thermonuclear and accelerator "beam-target".

Monte Carlo simulation of formation of a scintillation detector signal for specific experimental conditions allowed us to reproduce the time pattern of the signal dependence, which coincides with the corresponding features of the experimental waveform. During the simulation we considered the superposition of two independent neutron sources: an anisotropic source according to the "target beam" model, generating neutrons in all directions, and a narrowly focused neutron beam with an angular divergence of 3o between the axis of the device and the cone generatrix.

The analysis of the results of measurements and of the detector signal modeling made it possible to estimate the quantitative characteristics of the neutron beam narrowly focused along the axis of the plasma-focus device. The integral output of the narrowly focused beam can be compared with the integral output due to other mechanisms of neutron generation in PF and it is estimated in the considered measurements to be ~1010 neutron/discharge. The duration of generation of the narrowly focused neutron beam does not exceed several tens of nanoseconds. The angular divergence of the beam is estimated to be ± (3o-5o) from the axis of the plasma-focus device.

Modeling of the features on the experimental waveforms is not related to the description of the results in a specific discharge, but it demonstrates and explains the only possible reason for the occurrence (formation) of the recorded measurement results.

The capabilities of other measurement techniques in the study of the characteristics of the narrowly directed neutron beam generation are considered.

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLIX/It/ru/DR-Ablesimov.docx) [↑](#footnote-ref-1)