ANALYSIS OF NEUTRON RADIATION GENERATED IN THE COUNTER INTERACTION OF HIGH ENERGY DUTERIUM PLASMA FLOWS IN A MAGNETIC FIELD [[1]](#footnote-1)\*)

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One of the possible practical applications of pulsed plasma accelerators is the creation of neutron radiation sources for use in various scientific and technological purposes. The paper presents the results of a study of a pulsed source of D-D neutron radiation, based on the 2MK-200 installation, consisting of two electrodynamic accelerators installed at a distance of 3 m from each other [1]. A pulse with a duration of 5–10 μs was generated by the collision of two plasma streams with an energy content of 70–100 kJ in a conical plasma duct with a diameter of 219 to 166 mm with a narrowing in the middle. Plasma flows moved towards each other in a longitudinal magnetic field with induction up to 2 T.

As a result of the collision of flows in the interaction chamber, a cylindrical plasma formation was formed. In order to compact the neutron source, a supersonic D2 gas jet was added to the central section. The curtain density was 1017 particles/cm3.

To determine the extent of the neutron generation source formed as a result of the collision of plasma flows, scintillation detectors with a stilbene crystal placed in neutron collimators were used. The detector measured the intensity of neutron radiation within a solid angle of 7.85·10-3 sr., and a 30 cm thick layer of lithiated polyethylene provided a 10-fold attenuation of the neutron flux that did not fall within the solid angle. The detectors were placed in an additional lead sheath to protect against bremsstrahlung γ-radiation [2].

Efficient flow interaction occurs when fast warheads (with low density) collide with the main parts of the oncoming flow.

The collision of plasma bunches occurred in the central section of the plasma pipeline at a distance of 1.5 m from both accelerators. The displacement of the generation region, depending on the parameters of the experiment, was ± 0.5 m.

References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/Pt/ru/GU-Zharova.docx) [↑](#footnote-ref-1)