GENERATION OF SOFT X-RAY RADIATION IN THE INTERACTION OF A POWERFUL PLASMA FLOW WITH A GAS AND SOLID-STATE TARGETS IN A MAGNETIC FIELD [[1]](#footnote-1)\*)

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The report presents the results of a study of a powerful hydrogen plasma flow with a pulsed nitrogen jet and a tungsten target. Experimental data can be useful both from a fundamental point of view and in solving a number of applied problems (for example, for developing the concept of the ITER dissipative divertor and laboratory modeling of stellar jets penetrating into a galactic gas).

A plasma flow with a speed of (4÷6)×107 cm∙s-1 and an energy content of up to 40 kJ was created by a pulsed electrodynamic accelerator MKT (SRC RF TRINITI). The density of the plasma flow was (2÷4) × 1015 cm-3. The plasma flow was transported in a longitudinal magnetic field with an induction of 1÷2 T and interacted with a plane supersonic nitrogen jet, behind which a tungsten target was located at a distance of 1÷3 cm. The maximum density in the gas jet reached 1017 cm-3 with a jet thickness of ≈ 5 cm and a width of ≈ 15 cm.

SXR images of the interaction region of the plasma with the gas and the target, as well as the radiation spectra of the target plasma in the range of 1÷30 nm were recorded using a multi-frame MCP camera. For the absolute power of plasma SXR radiation, FDUK-8UVS photodiodes were used. The electron temperature of the plasma was determined by comparing the experimental spectra with the spectra obtained as a result of detailed kinetic calculations of the line plasma radiation, and was in the range 40÷50 eV at distances ≥ 4 mm from the target surface. In this case, the characteristic spectra of tungsten, observed in the absence of a nitrogen jet at a distance of up to 5÷6 cm from the target, were much smaller in the presence of gas in front of the tungsten surface already at a distance of ≈1cm.

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