TIME- AND SPACE-RESOLVED X-RAY EMISSION FROM HYFRID X-PINCH [[1]](#footnote-1)\*)

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The report presents the results of x-ray studies of hybrid X-pinch at the Cornell University XP facility (current pulse amplitude of 400 kA with a front duration of 100 ns) [1,2]. The goal of this work is to determine the main mechanisms for the formation of a pinch hotspot, including radiation collapse. At the final stage of matter compression in a fast pinch, all processes occur in less than 1 nanosecond [2]. In this case, the plasma parameters change by several orders of magnitude, reaching "stellar" values. Information about processes in plasma can be obtained by examining its x-ray dynamics with a time resolution of the order of several picoseconds. This raises the problem of synchronizing the recording equipment with the process under study, which is stochastic in nature. The choice of a hybrid X-pinch was determined by its significantly better reproducibility compared to the standard X-pinch. A measurement system based on Kentech x-ray chronogaphs, diamond sensors, broadband scopes and spectrographs with spherically bent crystals was created for synchronous study of the temporal, spatial, and spectral characteristics of pinch radiation [3]. Data on the dynamics and parameters of the plasma of hybrid X-pinches with loads from different materials were obtained.

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References

1. T.A. Shelkovenko et al., Phys. Plas., **17**, 112707, 2010.
2. T.A. Shelkovenko et al., Plas. Phys. Rep. **38**, 359-381, 2012.
3. S.A. Pikuz, T.A. Shelkovenko, D.A. Hammer, Plas. Phys. Rep. **41**, 445-491, 2015.
4. S.A. Pikuz, T.A. Shelkovenko, D.A. Hammer, Plas. Phys. Rep. **41**, 291-342, 2015.
1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/It/ru/CI-Pikuz.docx) [↑](#footnote-ref-1)