New X-Pinch Platform and Diagnostics for the MAIZE Facility

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X-pinches, formed by driving intense current through the crossing of 2 or more wires, provide an excellent platform for the study of "micro-pinches" due to their propensity to generate a single micro-pinch at a predetermined location in space (i.e., where the wires cross) [1, 2]. Ideally, micro-pinches compress to very small radii (~1 μm) leading to pressures on the order of ~1 Gbar for currents on the order of ~0.1 MA. However, the fraction of the total current that is driven through the dense micro-pinch plasma at small radii versus that being shunted through the surrounding coronal plasma at larger radii is not well known. To allow for the study of micro-pinches and their current distribution on the 1-MA MAIZE facility, an imaging Faraday rotation diagnostic, as well as corresponding X-pinch load hardware, are being developed [3]. Presented are preliminary experimental results investigating various X-pinches on the MAIZE LTD.

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References

[1] S. A. Pikuz, T. A. Shelkovenko, and D. A. Hammer, Plasma Physics Reports. **41**, 291 (2015).
[2] S. A. Pikuz, T. A. Shelkovenko, and D. A. Hammer, Plasma Physics Reports. **41**, 445 (2015).
[3] G. F. Swadling et al., Review of Science. Instruments, **85**, 11E502 (2014)