Abstract Submitted
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Experimental investigation on neutron production in a sheared-flow stabilized Z-pinch (FuZE)[1] Y. ZHANG, U. SHUMLAK, B.A. NELSON, E.L. CLAVEAU, E.G. FORBES, A.D. STEPANOV, T.R. WEBER, University of Washington, H.S. MCLEAN, D.P. HIGGINSON, J.M. MITRANI, Lawrence Livermore National Laboratory — Sustained neutron production has been demonstrated on the Fusion Z-pinch Experiment (FuZE), a sheared-flow-stabilized Z-pinch device.[1] Fusion-relevant plasma parameters, 200 kA plasma current, 1-2 keV ion temperatures and $>10^{17}$ cm^{-3} densities, have been achieved. Absolute neutron yields of up to 10^5 neutrons per discharge are measured. Measurements indicate that neutron production is primarily the result of thermonuclear processes. No obvious beam-target mechanism is observed. To further investigate the origin of detected neutron production, multiple calibrated plastic scintillator detectors, operating in pulse-counting mode, are used to characterize azimuthal directional property of neutron productions at various z-axial positions with respect to the Z-pinch plasma. Temporally- and spatially-resolved neutron production measurements are also conducted to characterize the neutron emission along z-axis. Moreover, multiple detectors are placed at various radial distance to the plasma to further investigate the neutron production properties. Experimental setup will be presented. Physics discussion on the results will be provided in detail. [1] Zhang et al. Phys. Rev. Lett. 122 135001 (2019).

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