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Application of Proton Deflectometry to Z-Pinch Plasma Systems at the Mega-Ampere Scale[1] DEREK MARISCAL, CHRIS MCGUFFEY, JULIO VALENZUELA, MINGSHENG WEI, FARHAT BEG, UC San Diego, RADU PRESURA, SHOWERA HAQUE, ANGEL ARIAS, AARON COVINGTON, HIROSHI SAWADA, University of Nevada Reno, Nevada Terawatt Facility, JEREMY CHITTENDEN, Imperial College — Measuring magnetic fields in z-pinch plasmas is challenging. Typical laser-probing diagnostics are limited by the critical density and large density gradients, while electrical diagnostics have limited spatial resolution. We report the first demonstration of proton deflectometry of z-pinch plasma systems at the mega-ampere scale. The proton beam was produced using the 10J 0.3ps Leopard laser and coupled to z-pinch plasma produced by Zebra, a 1MA pulsed-power driver at the Nevada Terawatt Facility. The magnetic field distorted the proton beam profile, which was recorded on radiochromic film. The experimental data was compared against integrated modeling using the resistive MHD code, Gorgon, for Z-pinch plasmas, in combination with the hybrid PIC code, LSP, for proton-beam trajectory tracking. This comparison provided the field and current configuration for various plasma loads, including wire and foil z-pinches.

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Derek Mariscal
UC San Diego

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