Abstract Submitted
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Towards hybrid particle accelerators with bright laser-driven ion beams from cryogenic low-Z jets[1] C. B. CURRY, F. TREFFERT, H.-G. J. CHOU, G. M. DYER, E. C. GALTIER, G. D. GLENN, A. GRASSI, J. B. KIM, R. MISHRA, C. SCHOENWAELDER, F. FIUZA, S. H. GLENZER, M. GAUTHIER, SLAC National Accelerator Laboratory, L. OBST-HUEBL, M. REHWALD, K. ZEIL, HZDR, H. J. QUEVEDO, E. MCCARY, R. ROYCROFT, B. M. HEGELICH, T. DITMIRE, UT Austin, S. GOEDE, EuXFEL, Y. Y. TSUI, UAlberta — Laser-driven ion beams produced via Target Normal Sheath Acceleration (TNSA) are suboptimal for direct injection into an RF linear particle accelerator in terms of ion energy, spatial control, and 6-D brightness. 2-D/3-D particle-in-cell (PIC) simulations have identified more favorable regimes using higher peak laser intensities and advanced target designs. Sub-micron planar cryogenic low-Z jets are used to explore ion acceleration in the relativistic transparency regime where high energy, low divergence ion beams are predicted. We demonstrate improved target characterization, precise directional control of the ion beam, and high brightness in experiments using the Texas Petawatt Laser. This work establishes a clear path towards hybrid particle accelerators operating at high repetition rate applications.

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Chandra Breanne Curry
SLAC National Accelerator Laboratory

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