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Measurement of Transformer Ratio from Ramped Beams in the Blowout Regime

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We present the plans for, and initial results from, a UCLA-Argonne collaborative plasma wakefield acceleration (PWFA) experiment aimed at demonstrating the dependence of transformer ratio –the relation between maximum acceleration observed in a plasma wake to the maximum deceleration of the driving beam –on beam shape. Utilizing the unique capabilities of the emittance exchange (EEX) beamline, we may obtain transformer ratios in excess of six in a ~ 120 MeV/m PWFA. These experiments are a crucial step in enabling applications ranging from compact X-ray free electron laser (FEL) light sources to TeV-class linear colliders for high energy physics.

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