Contribution ID: **330** Contribution code: **WEP033** Type: **Poster Presentation**

Experimental generation of petawatt peak power, extreme electron beams for advanced accelerator applications

Wednesday 13 August 2025 16:00 (2 hours)

In this contribution we report on the experimental generation of high energy (10 GeV), ultra-short (fs-duration), ultra-high current (~ 0.1 MA), petawatt peak power electron beams at the FACET-II National User Facility at SLAC National Accelerator Laboratory. These extreme beams enable the exploration of a new frontier of high intensity beam-light and beam-matter interactions broadly relevant across fields ranging from high-field plasma wakefield acceleration to laboratory astrophysics and strong field quantum electrodynamics. We demonstrate our ability to generate and control the properties of these electron beams by means of a laser-electron beam shaping technique. This experimental demonstration opens the door to on-the-fly customization of extreme beam current profiles for desired experiments and is poised to benefit a broad swathe of cross-cutting applications of relativistic electron beams including optimization of advanced accelerator applications.

Please consider my poster for contributed oral presentation

Yes

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

Experimental Generation of Extreme Electron Beams for Advanced Accelerator Applications, Phys. Rev. Lett. 134, 085001 –Published 27 February, 2025

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

Authors: MARINELLI, Agostino (SLAC National Accelerator Laboratory); Dr KNETSCH, Alexander (SLAC National Accelerator Laboratory); O'SHEA, Brendan (SLAC National Accelerator Laboratory); EMMA, Claudio (SLAC

National Accelerator Laboratory); STOREY, Douglas (SLAC National Accelerator Laboratory); Mr YOCKY, Gerald (SLAC National Accelerator Laboratory); RAJKOVIC, Ivan (SLAC National Accelerator Laboratory); SWANSON, Kelly (SLAC National Accelerator Laboratory); LARSEN, Kirk (SLAC National Accelerator Laboratory); HOGAN, Mark (SLAC National Accelerator Laboratory); MAJERNIK, Nathan (SLAC National Accelerator Laboratory); HESSAMI, Rafi (SLAC National Accelerator Laboratory); ROBLES, River (Stanford University); ARINIELLO, Robert (SLAC National Accelerator Laboratory); PEREZ, Sharon (SLAC National Accelerator Laboratory); GESSNER, Spencer (SLAC National Accelerator Laboratory)

Presenter: EMMA, Claudio (SLAC National Accelerator Laboratory)

Session Classification: WEP: Wednesday Poster Session

Track Classification: MC3 - Novel Particle Sources, Acceleration Techniques, and their Applications