



Contribution ID: 1753 Contribution code: TUPA104

Type: **Poster Presentation**

## **Status and first results from FACET-II towards the demonstration of plasma wakefield acceleration, coherent radiation generation, and probing strong-field QED**

*Tuesday, 9 May 2023 16:30 (2 hours)*

FACET-II is a National User Facility at SLAC National Accelerator Laboratory with the goal to develop advanced acceleration and coherent radiation techniques using a 10 GeV electron beam of unprecedented beam intensity with >100 kA peak current and <10  $\mu\text{m}$  spot size, a 10 TW experimental laser system, and a variety of solid, gas and plasma targets. A diverse experimental program will investigate beam-driven plasma wakefield acceleration (PWFA), injection, and control with the aim of demonstrating efficient multi-GeV/m PWFA while preserving emittance and narrow energy spread –as is required to reach the beam parameters for a future linear collider. Complimentary research programs into the application of machine learning for accelerator diagnostics and control, novel techniques for the generation of intense coherent radiation, and probing strong-field quantum electrodynamics (QED) also make use of the facility's unique beam intensity and laser capabilities. The first year of beam delivery to experiments has focused on user assisted commissioning of beam delivery and experimental systems, including a novel EOS BPM with 10 fs bunch length and 5  $\mu\text{m}$  transverse resolution. This contribution will describe the status of the facility, experimental systems, and novel diagnostics, in addition to reviewing the first scientific developments from User programs including initial progress towards beam-driven PWFA.

### **Funding Agency**

Work supported in part by the U.S. Department of Energy under contract number DE-AC02-76SF00515.

### **Footnotes**

### **I have read and accept the Privacy Policy Statement**

Yes

**Primary author:** STOREY, Douglas (SLAC National Accelerator Laboratory)

**Co-authors:** ADLI, Erik (University of Oslo); ALLEN, James (SLAC National Accelerator Laboratory); ALSBERG, Lauren (SLAC National Accelerator Laboratory); ARINIELLO, Robert (Colorado University at Boulder); BERMAN, Lily (University of Strathclyde); BUCKSBAUM, Philip (Stanford PULSE Institute); CAO, Jiawei (University of Oslo); CLARKE, Christine (SLAC National Accelerator Laboratory); CORDE, Sebastien (Laboratoire d'Optique Appliquée); DOSS, Christopher (Colorado University at Boulder); EDELEN, Auralee (SLAC National Accelerator Laboratory)

Laboratory); EKERFELT, Henrik (SLAC National Accelerator Laboratory); EMMA, Claudio (SLAC National Accelerator Laboratory); FIUZA, Frederico (Instituto de Plasmas e Fusão Nuclear); GERSTMAYR, Elias (SLAC National Accelerator Laboratory); GESSNER, Spencer (SLAC National Accelerator Laboratory); GILLJOHANN, Max (Laboratoire d'Optique Appliquée); HANSEL, Claire (Colorado University at Boulder); HAST, Carsten (SLAC National Accelerator Laboratory); HESSAMI, Rafi (Particle Beam Physics Lab (PBPL)); HIDDING, Bernhard (Cockcroft Institute); HOGAN, Mark (SLAC National Accelerator Laboratory); HOLTZAPPLE, Robert (California Polytechnic State University); JOSHI, Chan (University of California, Los Angeles); KEITEL, Christoph (Max-Planck-Institut für Kernphysik); KNETSCH, Alexander (Laboratoire d'Optique Appliquée); LARSEN, Kirk (SLAC National Accelerator Laboratory); LEE, Valentina (Colorado University at Boulder); LITOS, Michael (Colorado University at Boulder); LONEY, Ryan (SLAC National Accelerator Laboratory); MARSH, Kenneth (University of California, Los Angeles); MARINELLI, Agostino (SLAC National Accelerator Laboratory); MATHERON, Aimé (Laboratoire d'Optique Appliquée); MEUREN, Sebastian (SLAC National Accelerator Laboratory); MISKOVICH, Sara (SLAC National Accelerator Laboratory); NIE, Zan (University of California, Los Angeles); O'SHEA, Brendan (SLAC National Accelerator Laboratory); PARKER, Marcellus (SLAC National Accelerator Laboratory); PETERSON, Thomas (SLAC National Accelerator Laboratory); REIS, David (Michigan University); ROBLES, River (Stanford University); ROUSSEL, Ryan (SLAC National Accelerator Laboratory); SAN MIGUEL CLAVERIA, Pablo (Laboratoire d'Optique Appliquée); Dr SCHEINKER, Alexander (Los Alamos National Laboratory); SUTHERLAND, Andrew (University of Strathclyde); TAMBURINI, Matteo (Max-Planck-Institut für Kernphysik); VAFAEI-NAJAFABADI, Navid (Stony Brook University); WANG, Junzhi (University of Nebraska - Lincoln); WATT, Robbie (SLAC National Accelerator Laboratory); WHITE, Glen (SLAC National Accelerator Laboratory); YAKIMENKO, Vitaly (SLAC National Accelerator Laboratory); YOCKY, Gerald (SLAC National Accelerator Laboratory); ZGADZAJ, Rafal (The University of Texas at Austin); ZHANG, Chaojie (University of California, Los Angeles)

**Presenter:** STOREY, Douglas (SLAC National Accelerator Laboratory)

**Session Classification:** Tuesday Poster Session

**Track Classification:** MC3: Novel Particle Sources and Acceleration Techniques: MC3.A22: Plasma Wakefield Acceleration