Contribution ID: **209** Type: **poster**

Stability analysis of plasma photocathode produced ultrahigh brightness electron beams

Wednesday, 18 September 2019 19:00 (1 hour)

The plasma photocathode particle-driven Wakefield accelerator (TH-PWFA) is a promising path towards ultrahigh 5D-brightness and multi-GeV electron beams for application such as X-Ray free-electron laser (XFEL), inverse Compton scattering (ICS) and High Energy Physics (HEP). Recent experimental breakthroughs within the "E210: Trojan Horse PWFA" collaboration obtained at Stanford Linear Accelerator Center (SLAC) FACET and new conceptual energy spread reduction method suggest that unprecedented ultrahigh 6D brightness electron beams can be generated in university-scale laboratories. However, applications such as XFEL, ICS, and HEP require tight control over the shot-to-shot electron beam parameters for reliable operation. Therefore, for a mature technology, the evaluation of electron beam parameter stability is a mandatory task. Here, we report on a systematic jitter analysis of the plasma photocathode method generated electron beams in PWFA. We evaluate the influence of the injection laser pulse jitter and the charge particle driver beam on the trapped electron beam quality. The results from this study indicate that the electron beam parameter shot-to-shot stability is comparable to the state-of-the-art rf-based accelerators. These findings are very encouraging for the upcoming experimental campaigns at SLAC FACET-II: e.g "E310: Trojan Horse-II" and "E313: Multibunch dechirper for ultrahigh 6D brightness beams".

Primary author: HABIB, Fahim A. (SUPA, Department of Physics, University of Strathclyde, Glasgow, UK and Cockcroft Institute, Sci-Tech, Daresbury, UK.)

Co-authors: Mr KIRWAN, Gavin; Dr MANAHAN, Grace Gloria (University of Strathclyde); BEATON, Andrew (University of Strathclyde); SCHERKL, Paul (University of Strathclyde); ULLMANN, Daniel (University of Strathclyde); HEINEMANN, Thomas (Uni Strathclyde / DESY); BOULTON, Lewis (University Of Strathclyde / DESY); NUTTER, Alastair (University of Strathclyde); BRUHWILER, David; CARY, John R.; HOGAN, Mark (SLAC National Accelerator Laboratory); YAKIMENKO, Vitaly (SLAC); Prof. ROSENZWEIG, James (UCLA Dept. of Physics and Astronomy); HIDDING, Bernhard (Scottish Universities Physics Alliance, Department of Physics, University of Strathclyde; Cockcroft Institute, Sci-Tech Daresbury)

Presenter: HABIB, Fahim A. (SUPA, Department of Physics, University of Strathclyde, Glasgow, UK and Cockcroft Institute, Sci-Tech, Daresbury, UK.)

Session Classification: Cheese and Wine Poster Session 2

Track Classification: WG1 - Electron beams from plasmas