John Adams Institute for Accelerator Science

John Adams Institute for Accelerator Science Lecture Series

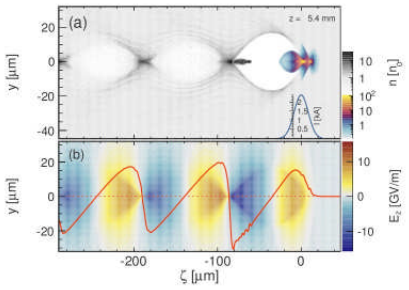
Tuesday 18th February 2014 at 4:15pm
Fisher Room, Denys Wilkinson Building

Plasma wakefield acceleration: towards high-quality stable beams at FLASHForward at DESY

The lecture will be delivered by
Julia Grebenyuk,
DESY

Abstract: *Julia Grebenyuk, Lucas Schaper, Alberto Martinez de la Ossa, John Dale, Vladyslav Libov, Johann Zemella, Christopher Behrens, Matthew Streeter, Tobias Kleinwächter, Timon Mehrling, Jan-Patrick Schwinkendorf, Steffen Wunderlich, Lars Goldberg, Olena Kononenko, Alexander Aschikhin, Halil Tarik Olgun, Carlos Entrena, Bernhard Schmidt, Jens Osterhoff*

Plasma-wakefield acceleration (PWA) is a novel acceleration technique which allows to achieve accelerating gradients orders of magnitude higher than in conventional radio-frequency modules. Once fully developed, it will allow to significantly reduce costs and increase energies of particle beams for applications, such as X-ray and light sources, and potentially for high-energy physics colliders. When being focused into a plasma a short intense laser or an ultra-relativistic beam expels plasma electrons out of its way, creating a structure with good accelerating and focusing properties. In the past decade many important milestones has been achieved in PWA, such as GeV beams on centimetre scale, mono-energetic spectra, beam stability and reproducibility, as well as controlled injection techniques have been developed and demonstrated. Many of those advances have been made in laser-driven schemes, beam-driven plasma acceleration in contrast has not been explored that much due to more complex setups and higher costs. DESY laboratory (Hamburg, Germany) has recently started developing a PWA-oriented programme with acceleration being driven by an FEL-quality electron beam at FLASH facility. The goals of the future experiments (to commence in 2015) are demonstration of high-quality beams produced with beam-driven PWA, high energy transfer ratios from the driver to the witness beam, demonstration of controllable injection techniques. The seminar will cover basics of plasma acceleration, its current status, perspectives and challenges. Beam-driven PWA at FLASHForward will be discussed in detail, with the emphasis on the physics programme, experimental setup and expected results.



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