Contribution ID: **2330** Contribution code: **THODA2** Type: **Contributed Oral Presentation**

FLASHForward: experimental progress towards an idealised plasma-based energy booster

Thursday, 11 May 2023 09:50 (20 minutes)

Beam-driven plasma-wakefield acceleration is a promising avenue for future accelerators, where a high electric field gradient could reduce the size and cost of a high-energy physics or a photon-science facility. Successful experimental results in recent decades have demonstrated the feasibility of high-gradient acceleration in plasma. However, to meet the demands of current conventional accelerator users in terms of luminosity and brightness, there are more milestones to reach. Preservation of beam quality, high overall energy-transfer efficiency, and high-average-power operation comprise the three major research pillars of FLASHForward: a plasma-wakefield-acceleration research facility at DESY. Recent results from FLASHForward include permille-level energy-spread preservation; high energy-transfer efficiency of 42% from the wake to the accelerating bunch; and the in-principle operation of plasma accelerators at O(10 MHz) inter-bunch repetition rates — all demonstrating promise to shrink the footprint of future accelerator facilities without a loss in functionality or efficacy. In this submission an overview of the facility, recent results, and future outlook are presented.

Funding Agency

Footnotes

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Yes

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Session Classification: MC03.3 - Novel Particle Sources and Acceleration Techniques (Contributed)

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