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Advances in Two-Bunch Plasma Wakefield Acceleration at FACET-II

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The Facility for Advanced Accelerator Experimental Tests II (FACET-II) has successfully completed its first plasma wakefield acceleration (PWFA) experiments using the two-bunch beam delivery configuration. In these initial studies, a drive and witness pair of bunches were produced at the photocathode injector, co-accelerated, and transported to the experimental area. Two plasma sources were employed for PWFA: either a 40 cm long lithium plasma oven, or a multi-meter long hydrogen static fill, both of which were beam-ionized via the drive bunch. We will present preliminary results demonstrating multi-GeV energy gain of the witness bunch, measurements of the energy spread and emittance of the accelerated charge, along with comparative performance from the two plasma sources. Additionally, we will discuss plans for refining the two bunch delivery to enhance the capture and acceleration of the witness bunch.

Working group

WG3 : Beam-driven plasma acceleration

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