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Transverse plasma density redistribution in discharge capillaries for plasma acceleration

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FLASHForward is a beam-driven plasma-wakefield accelerator (PWFA) experiment at DESY, acting as a test bench to develop technologies to accelerate electron beams with high quality and high average power. By enhancing conventional acceleration methods with plasma acceleration, the cost and footprint of future accelerators could be significantly reduced. To achieve this, it is crucial to have detailed knowledge of plasma dynamics, both spatially and temporally, in the plasma accelerator stage. FLASHForward utilises discharge capillary plasma sources. An in-house hydrodynamic plasma model was used to simulate these sources. Simulated plasma density profiles are then input into particle-in-cell (PIC) codes to simulate beam-plasma interaction. In this contribution, such simulations are compared to experimental measurements of electron bunch deceleration to provide insight into transverse plasma density redistribution at microsecond timescales.

Working group

WG3 : Beam-driven plasma acceleration

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