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Plasma torch electron bunch generation in plasma wakefield accelerators

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We present a novel and very robust scheme for optical triggered electron bunch generation in plasma wakefield accelerators. In this technique a quasi-stationary plasma column is ignited prior the arrival of the plasma wave by a transversally propagating, focused laser pulse. This localized plasma torch is easy tunable by shifting the laser focal position and spot size and causes a strong distortion of the plasma blowout during passage of the electron driver bunch, leading to collective alteration of plasma electron trajectories and to controlled injection. The proposed method is more flexible and faster when compared to hydrodynamically controlled gas density transition methods and it fits experimentalist's needs as it is straight forward to implement and easy to align. Hereby it is also suited for probing a wakefield and timing purposes.

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