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## Characterization of beam driven ionization injection in the blowout regime of Plasma Acceleration

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The scope of this work is to characterize the novel and promising strategy for ionization-induced trapping of electrons in a beam driven plasma accelerator, originally proposed by A. Martinez de la Ossa et al. [Phys Rev Lett (2013)]. The beam driven ionization injection scheme is based on the field ionization of a dopant gas confined in a small region within a hydrogen plasma background. The ionized electrons are captured by the non-linear plasma wave at the accelerating and focusing wake phase, leading to high-brightness trailing bunches. The quality of the ionization-injected trailing bunches strongly and non-linearly depends on the properties of the dopant gas (density, initial ionization state). We used the full 3D PIC code ALADYN to take into account the kinetic, three dimensional nature of the phenomenon. By means of a systematic approach we have investigated the emittance and energy spread formation and evolution for different dopant gases and configurations. For a selected case we studied the ionization-injected bunch acceleration and transport over long distance (a few cm).

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