

# Beam current from downramp injection in electron-driven nonlinear plasma wakefields

*Tuesday, 19 September 2023 19:00 (1h 30m)*

We study the stability of plasma wakes and the properties of density-downramp injection in an electron-driven plasma accelerator in the blowout regime. As shown by particle-in-cell (PIC) simulations, the accelerating structure remains highly stable until the moment some electrons of the driver reach almost zero energy, which corresponds to the best interaction length for optimal driver-to-plasma energy transfer efficiency. For a particular electron driver, this efficiency can be optimized by choosing the plasma density. Studying the dependence of the current of the injected beam on driver and plasma parameters, we show that it does not depend on the density downramp length as long as the condition for trapping is satisfied. Most importantly, based on theoretical scalings and PIC simulations, we find that the current of the injected beam primarily depends on just one parameter which combines both the properties of the driver (its current and duration) and the plasma density.

**Primary authors:** Dr HUE, Celine (Weizmann Institute of Science); Dr GOLOVANOVA, Anton (Weizmann Institute of Science); Dr TATA, Sheroy (Weizmann Institute of Science); CORDE, Sebastien (Laboratoire d'Optique Appliquée); MALKA, Victor (Weizmann Institute of Science)

**Presenter:** Dr GOLOVANOVA, Anton (Weizmann Institute of Science)

**Session Classification:** Poster session

**Track Classification:** WG1: Plasma-based accelerators and ancillary components