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Effects of plasma ramp measured in AWAKE

Monday, 19 September 2022 19:15 (1 hour)

We study the propagation of an electron bunch travelling within a proton bunch through a plasma density ramp. Because the proton bunch density in the ramp is higher than the plasma density, the bunch generates a high density, on-axis plasma electron filament. This filament is defocusing for the electron witness bunch that can therefore be lost along the ramp. At AWAKE we have measured this effect by changing the relative timing of the electron bunch with respect to the proton bunch. When the electron bunch propagates in front of the proton bunch (i.e. seeding the self-modulation), the electrons travel until the electron spectrometer, downstream of the plasma column. A position of the electrons within the proton bunch, where seeding stops, exists. Beyond this position electrons are lost and do not reach the spectrometer. We will present latest experimental data obtained during Run 2.

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