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High transformer ratio resonant PWFA working point design for EuPRAXIA@SPARC_LAB

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In the context of plasma wakefield acceleration beam driven, we design and numerically test an ideal working point that exploits the resonant behavior of a train of driving bunches with ramped charge in order to accelerate a trailing bunch to high energy. The working point consists in a train of four bunches generated by an RF X-band photo-injector with the energy of 1.2 GeV. The bunch current profile is shaped by means of hybrid compression stage exploiting the combination of velocity bunching and magnetic chicane. The charges are properly calibrated in order to maximize the transformer ratio up to $RT=8$. The trailing bunch has a triangular shape and a peak current $I=3kA$. By means of a 2.4m long plasma channel we simulated the acceleration of the trailing bunch up to 5GeV mainly preserving the quality of the accelerated beam. The simulations were performed in cylindrical symmetry with the hybrid kinetic-fluid code Architect

Primary authors: DEL DOTTO, Alessio (INFN); ROSSI, Andrea Renato (MI); FERRARIO, Massimo (LNF); ROMEO, Stefano (LNF)

Presenter: ROMEO, Stefano (LNF)

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