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Low Energy Bunch Compression with Dogleg Chicane

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The ESCULAP project joins the photo injector PHIL with the High Power Laser LASERIX to perform a laser plasma wakefield acceleration (LPWA) experiment. A prerequisite is that the electron beam (10pC,10MeV) has to be compressed longitudinally before being injected into the plasma cell from 2000fs (FWHM) to less than 300fs (and later 100fs). To achieve such compression we present a solution based on a dogleg chicane. The design of this chicane uses the simulation codes ASTRA and ImpactT. Effects such as 3D space charge and coherent synchrotron radiation are taken into account. The simulation result states that space charge and CSR have little effect on transverse emittance, but lead to a phenomenal growth in bunch length. Then the electron bunch is focused with a solenoid and injected into plasma, a preliminary result shows that more than 50% particles can be trapped and accelerated.

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