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## High energy plasma injector for future electron-positron collider

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The next generation electron-positron collider is crucial for precision measurements of the Higgs boson and exploring new physics beyond the Standard Model. Currently, the scale and cost of linear or circular colliders based on traditional radio-frequency accelerators are enormous to meet the standards for a Higgs factory. Advanced accelerator concepts such as the plasma wakefield accelerator (PWFA) can provide acceleration gradient orders of magnitude higher than RF cavities, which may greatly reduce the scale and cost of these facilities. At present, the state-of-the-art developments for these schemes fall short of achieving the beam parameters required by the collider. We propose a hybrid electron-positron collider scheme which uses PWFA as a high energy injector for the future collider. The plasma wakefield accelerators greatly boost the energy of the electron and positron beams from the RF Linacs by multiple times before injecting them into the booster or collider rings. Nearly start-to-end numerical simulations show that the final beam parameters of the electron and positron beams fulfill the requirements of the booster. The developments in this scheme can be a significant middle step towards the future plasma based linear colliders.

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