

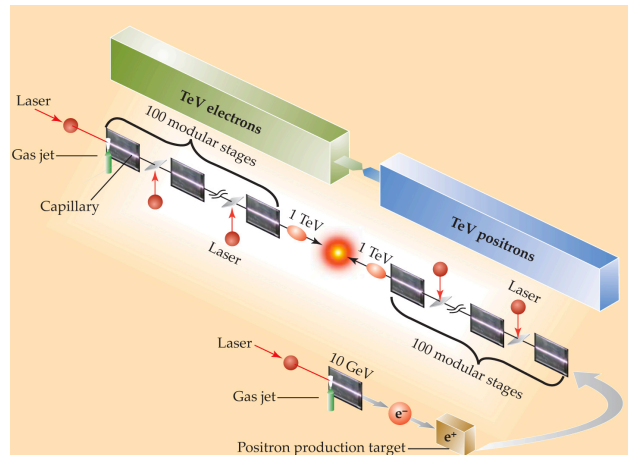
Compact laser-based positron creation, capture, and cooling

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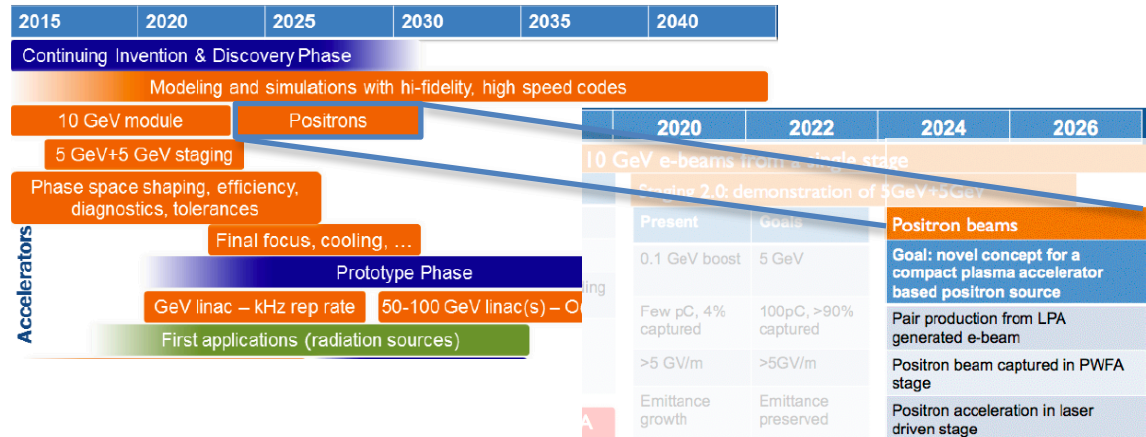
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“with the completion of a 10 GeV electron LWFA stage, the 10 GeV beam may be employed for electron-positron pair creation and subsequent positron beam capture and LWFA. Development of an LWFA-based positron source would enable compact experiments on LWFA and focusing of positron beams”

Advanced Accelerator Concepts (AAC) Research Roadmap Workshop Report (2016)



E. Esarey, W. P. Leemans, Physics Today (2009)



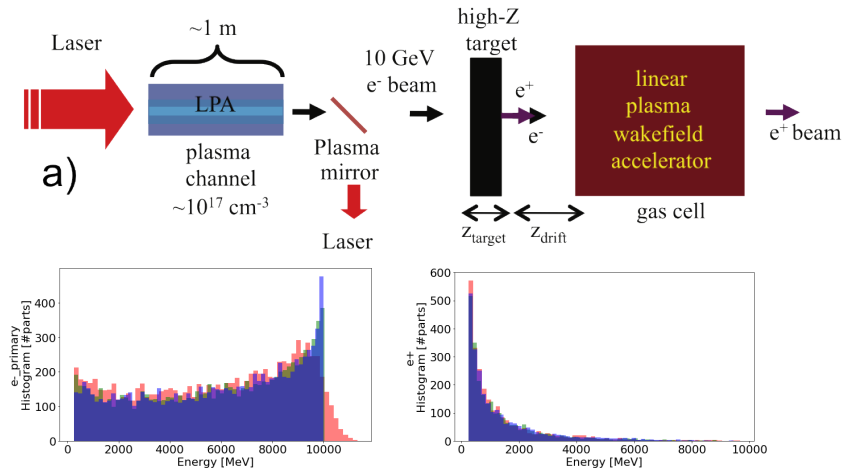
Several positron creation and capture methods need to be considered.

Positron creation methods:

1. LPA electron beam interaction with a thin solid density foil
2. Intense laser pulse interaction with a thin solid density foil
3. LPA electron beam interaction with an intense laser pulse

Positron cooling methods:

1. Laser cooling (via Thompson or Compton scattering)
2. Plasma wave cooling



The spectra of electron beam after the interaction with the solid density foil and the produced positron beam spectrum .

Research and Development of laser-plasma-based lepton accelerators would greatly benefit from:

1. A compact method of laser-based positron creation and capture.
2. The development of advanced, compact cooling techniques.

Development of a compact method of beam cooling could potentially benefit any future lepton collider.