Abstract ID : **1313**

Status of Ce+BAF: Polarized Positron Beam Capability at CEBAF 12 GeV

Content

Positron beams would provide a new and meaningful probe for the experimental program at the Thomas Jefferson National Accelerator Facility (JLab). The JLab Positron Working Group, formed in 2018 and now with over 250 members from 75 institutions, continues to develop an experimental program with high duty-cycle positron beams including but not limited to future hadronic physics and dark matter experiments. Critical requirements involve generating positron beams with a high degree of spin polarization, sufficient intensity and a continuous-wave (CW) bunch train compatible with acceleration to 12 GeV at the Continuous Electron Beam Accelerator Facility (CEBAF).

In this presentation we describe a start-to-end layout for positron beams at 12 GeV CEBAF utilizing the Low Energy Research Facility (LERF) at Jefferson Lab to build two new injectors. A GaAs dc high voltage photo-gun first generates >1 mA of polarized electrons which are then accelerated to 80-150 MeV and directed to a high-power spinning W target for polarized bremsstrahlung and positron pair creation. A second injector then collects, bunches and accelerates the positrons to 123 MeV. The positron beams are transported by a new beam line and injected into the CEBAF acceptance for acceleration to the end stations with energies up to 12 GeV. The layout is optimized to provide Users with positron spin polarization >60% and intensity greater than >100 nA, and with higher intensities when polarization is not required.

Footnotes

- J. Arrington, et al., "Physics with CEBAF at 12 GeV and Future Opportunities" (2021) https://arxiv.org/abs/2112.00060.

** A. Accardi, et al., "An experimental program with high duty-cycle polarized and unpolarized positron beams at Jefferson Lab" (2020) https://arxiv.org/abs/2007.15081

*** D. Abbott, et al., "Production of highly polarized positrons using polarized electrons at MeV energies", Phys. Rev. Lett. 116 (2016) 214801.

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Yes

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Comments:

I did not find a track related to positron sources or injectors.

Submitted by **Dr GRAMES, Joseph** on **Tuesday, December 6, 2022**