**Title**: Ce+BAF : Polarized and Unpolarized Positron Beam Capability at CEBAF 12 GeV

**Presenter**: Joe Grames (on behalf of the Ce+BAF working group)

**Abstract**:

Positron beams would provide new and meaningful probes 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 [1, 2], 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 the start-to-end layout, utilizing the Low Energy Research Facility (LERF) to build two new injectors First a polarized electron beam line provides >1 mA of polarized electrons at (80-150 MeV) to a high-power target for positron production. Next, a second injector collects, bunches and accelerates the positron bunch to 123 MeV. Finally, the positrons 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 beam source is being optimized to provide Users with spin polarization >60% and intensity greater than >100 nA, and with higher intensities when polarized is not required.

**Keywords:**

High duty-cycle positron beams, high positron beam polarization, PEPPo polarization transfer

technique.

**References:**

[1] J. Arrington, et al., “Physics with CEBAF at 12 GeV and Future Opportunities” (2021) <https://arxiv.org/abs/2112.00060>.

[2] 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>

[3] D. Abbott, et al., “Production of highly polarized positrons using polarized electrons at MeV energies”, Phys. Rev. Lett. **116** (2016) 214801. doi:10.1103/PhysRevLett.116.214801.

**Acknowledgments (JLab, ORNL, IJCLab, Univ Sinaloa)**

This project is supported by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics

under contract DE-AC05-06OR23177; UT-Battelle, LLC, under contract DE-AC05-00OR22725 with the

US Department of Energy (DOE); the European Union's Horizon 2020 research and innovation program

under agreement STRONG - 2020 – No. 824093; the Programa de Fomento y Apoyo a Proyectos de

Investigación code A1-022, from the Universidad Autónoma de Sinaloa.