

The Ce^+ BAF Jefferson Lab Upgrade Initiative

E. Voutier and the Jefferson Lab Positron Working Group

Université Paris-Saclay, CNRS/IN2P3/IJCLab, 91405 Orsay, France

The longtime interest for high-duty factor polarized and unpolarized positron beams at Jefferson Lab (JLab) [1] developed over the past decade to constitute today a building block of the JLab Upgrade Initiative known as Ce^+ BAF 12 GeV [2]. Positrons produced in an electromagnetic shower resulting from a sub-GeV high-duty cycle and high-intensity polarized electron beam within a high-Z target, take advantage of the PEPPo (Polarized Electrons for Polarized Positrons) technique [3] to uniquely produce a highly polarized positron beam from a compact accelerator footprint. These beams enable a unique experimental program [4] bringing new experimental observables to reveal the details of the electromagnetic interaction, unravel the structure of nucleons and nuclei, and investigate the existence of physics beyond the standard model. Along the path to GeV positron beams at JLab, new capabilities should also emerge, providing opportunities not only for low-energy (sub-GeV) Nuclear Physics but also for Atomic Physics and Material Science.

This presentation will discuss the experimental physics program of the JLab Positron Working Group (PWG) at GeV beam energies, particularly the approved proposals illustrating the three scientific pillars of the program [5] and some of the most significant developments which emerge along with the currently on-going positron source R&D.

References

- [1] E. Voutier, *Nucl. Theor.* **33** (2014) 142.
- [2] (Ce^+ BAF Working Group) J. Grames et al., *JaCOW IPAC2023* (2023) MOPL152.
- [3] (PEPPo Collaboration) D. Abbott et. al. *Phys. Rev. Lett.* **116** (2016) 214801.
- [4] (The Jefferson Lab Positron Working Group) A. Accardi et. al., *Eur. Phys. J. A* **57** (2021) 261.
- [5] (The Jefferson Lab Positron Working Group) E. Voutier, *EPJ Web Conf.* **303** (2024) 06003.