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Polarized positron yield optimization based on a two target system for Jefferson Lab[1] NICHOLAUS TROTTA, Duquesne University, JOE GRAMES, Jefferson Lab, FATIHA BENMOKHTAR, Duquesne University — The polarized electron beam at the DoE's Continuous Electron Beam Accelerator Facility at Jefferson Lab is used as a probe to study nuclear states of matter. New experiments are being proposed to instead use polarized positrons, the anti-electrons, for complementary measurements. Positrons are produced in the electron-magnetic shower when electron beam strikes a target composed of high-Z atoms. The positron yield relies on depositing 10's of kW of beam power on the target which itself must be nestled close to a high field solenoid magnet used to focus and form the positron beam. Therefore, the efficiency of a conventional "single-stage" positron source depends on the design of a sophisticated vacuum volume, which includes: the target, magnetic field, radiation shielding, and challenging thermal loads. As an alternative, we studied a "double stage" design with separated bremsstrahlung radiator and pair-production target. In this design, the radiator serves to dissipate the brunt of the electron beam power and might be well-shielded, but illuminates out-coming bremsstrahlung radiation on a second pair-production target. In this contribution, we evaluate the total positron yield and polarization in terms of the thermal and radiative loads, in order to list the pros and cons of both configurations.

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