e^+@CLAS12 Meeting Notes

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- The strategy to approach the PAC for installing a positron program at CEBAF is to propose 2 experiments, one with the NPS in Hall C and the other with CLAS12, focused on the flagship GPD-physics, specifically the DVCS off proton channel where large charge asymmetry signals are expected.
- The positron source design goals are: unpolarized beams with 1μA maximum intensity, and polarized beams up to 100nA with 40% minimal polarization. The source would be installed in the injector area and would operate with a 1mA and 10 MeV polarized electron beam. Multi-Hall operation in polarized mode appears difficult, but can be envisaged with unpolarized positron beams. Polarization may be a compromise variable. The discussion of the source and the operation of CEBAF with positrons is the focus of the accelerator sub-group. Its goal is to procure a report addressing accelerator issues before the proposal submission deadline.
- Within the same approach, the operation of the Hall B beam line and equipment with positrons should also be assessed. For instance, one device to consider more closely is the Møller polarimeter which obviously needs some polarity change and possibly some configuration change depending on Bhabha scattering asymmetries.

The proposal charge is to demonstrate the impact of the measurements with positron beams in terms of the physics output. The physics case was clearly developed in the LOI, advocating for unpolarized charge asymmetries for the extraction of the real part of the BH-DVCS interference in connection with the D-term, and could also be extended to the CFF extraction through the local fit developed by Michel, similarly to the n-DVCS part of the LOI. The main issue here is to demonstrate the control of the effects of systematic errors to a level satisfactory enough for extracting a physically meaningful charge asymmetry.

- The golden observable is the unpolarized cross sections which is expected to provide the largest signal when compared to electrons.
- The beam spin asymmetry is also of interest. However, the difference between electrons and positrons is supposed to be a twist-3 contribution, most likely small and difficult to extract meaningfully. Nevertheless, the sum of electron and positron polarized cross section differences provides a pure twist-2 observable and remains a signal of significant amplitude. The polarized beam case appears demanding not only from the experimental side, but also from the beam time side with a single Hall operation mode.
- Systematics between electron and positron beams should be experimentally controlled and assessed on the basis of the measurement of a known process that would serve as calibration purposes.

List of tasks & assignments

i) Identification/review of issues with operating Hall B beam line with positrons
ii) Identification/review of issues with operating CLAS12 with positrons for comparison with electrons

iii) Identification/review of the different source of systematic errors in the comparison of electron and positron cross section
iv) Definition of an electron and positron calibration experiment
v) Modifications of the Møller polarimeter to operate in Bhabha scattering mode (Eric)
vi) Generation of DVCS quasi-data considering approved DVCS measurements with CLAS12 and expected positron measurements with the same luminosity than electrons (FX)
vii) Extraction of D-term from expected data and evaluation of the impact of unpolarized positron beams (FX)
viii) Extraction of the CFF from expected data and evaluation of the impact of unpolarized and polarized positron beams (Silvia)