CPS DOCUMENTATION OUTLINE

Motivation: Science Gain with CPS

- Polarization observables in Wide Angle Compton Scattering
- Limitation of polarized targets
- Solution: a pure photon source: photon flux 30x greater than with 100nA mixed photon electron beam and with nominal target overhead

The Compact Photon Source (CPS)

- Conceptual design: magnet, collimator/raster, Cu core, hermetic shielding
- Magnet - 3.2 T, tapered
- Central absorber – Cu
- W-powder shield

Hermetic Shielding - Radiation Calculations

- *Goal*: beam energies up to 12 GeV, up to 30kW electron beam in Hall A/C (currents ~2.7uA), run time 1000 hours, photon source as close to target as possible
- *Requirements*: Prompt dose rate in hall < several rem/h at 10m from device, Activation dose outside the device envelope at 1 ft distance < several mrem/h after one hour following the end of a 1000 hour run, Prompt dose rate at the site boundary < 1 microrem/r (2.4 microrem/h corresponds to typical experiment not requiring extra shielding) during run
- *Logic* - Radiation from source should be a few times than that from the photon beam interaction with the material of a polarized target
- Compare radiation simulation with polarized target and 100nA electron beam and photon beams with radiation simulation of CPS upstream of empty target

Radiation studies - realistic shielding concept and radiation resistant magnet

- Prompt radiation doses: doses, and at boundary
- Accumulated damage electron/photon - safety concerns for electronics, results:
- Activation doses 1 hour after 1000 hour run around target
- Neutron fluence and damage - importance of boron/plastic
- Backward shielding

Engineering aspects

- power deposition
- Heat Load in target
- material choice and weight
- minimization of disassembly
- Magnet construction

Appendix: Concept transfer to Hall D