Simulation Tasks

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Simulation Tasks

Outline

- Ongoing Analysis Projects
- Analysis Projects Needing Adoption
- Generator Work
- Incorporating Complete Apparatus
- Coding Framework
- Summary

Many Analyses Projects are in Progress...

- FoM optimization (tune. coll, det size, S/N)
- Hybrid coil position sensitivity study
- Main detector design and PE maximization
- Study of power deposition in collimators
- Best collimation for blocking 1 (and 2) bounce γ's
- Target length studies (could shorter target payoff in S/N?)

...But Many More Need Adoption!

- Detailed study of primary collimator location
- Optimize target to detector distance for a given tune
- A_T correction (re-examine azimuthal/phi_wrap cancellations)
- $A_{Inelastic}$ correction (re-examine/refine strategy)
- What's needed to achieve required Q^2 precision? Locations and resolution of trackers (and sieve)?
- Study leakage effects from neighboring rings into Møller ring
- Reversing spectrometer polarity for direct measurement of pair-symmetric contributions
- Benefits of running with different solid dummy targets (Be,C,Al,...) to study bkgds, optics during the experiment

Of course there are many more...

- Smear detector responses of Total Absorption aux. detectors
- Study Effects of Brem. photon asymmetries in TA showers
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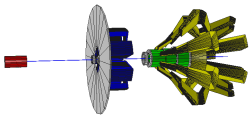
Generator Enhancements

- Al window scattering
- pre-vertex multiple scattering (done, but needs to be committed)
- Realistic beam offset and angle smearing
- Internal radiative corrections
- Pair-production effects–radiated γ's either from external Brems. or decays from hadronic final states turning back into electrons (How big is this effect?)
- Explore alternative sampling techniques
- Refine inelastic ep gen. to include more accurate FF's and σ_T
- Incorporate depolarization effects into generators (small effect)

More Generator-related Work

- Implement Pion generator (Much work already done here)
- Hyperon decay generator needed
- High statistics benchmarking of Møller generator using GEANT physics
- Benchmark pre-vertex radiative effects using GEANT
- Externalize generators to speed up simulation
- Low angle scattering (GEANT physics or generator?) for Lumi studies
- Incorporate false asymmetries and helicity correlated effects (Similar to Jim Birchall's Qweak studies) – can use to study, for example, impact of asymmetric acceptances...



Incorporating Complete Experimental Assembly

- Target (internal structures, walls,...)
- Beam pipe (and support structures)
- Finalize magnet design
- Magnet coil vacuum chambers? Coil support structures
- Realistic collimators (Geometry, Cooling?)
- Tracking dets (WC's?, GEMs, SciFi?: geom., Roman Pots, shielding, movers,...)
- Vacuum window downstream of hybrid torus; drift region
- Main and auxiliary detector rings (locations, geometry, materials...) and support frame
- Detector ring PMT shielding
- Sieve for optics calibration?

Simulation Framework Development

- GDML implementation approach? How to best organize structures/materials/volumes?
- Creation of additional Messengers: Target length, changing standard physics list, turning on/off secondary particle tracking, ...
- What special needs will the various working groups need?
- Digitizing sensitive detector responses – incorporating light collection → PE's → ADC (including electronic noise...)
- Simulate raw data file – to facilitate analyzer (integrating and sampling) development → root file histograms / event displays
- Documentation (philosophy/approach to feature implementation and analysis studies)

Summary

- Much has been done but still much is needed
- Need man-power (students, post docs, ...)
- Need various working-groups to give input to simulation
- Need volunteers to take on projects–which involve both analysis and simulation code development to facilitate the analysis
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