SoLID Simulation Organization and Status

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Outline

- Director's Review Issues
- Pre R&D Goals and Request
- General Status

Director's Review Issues

11 Recommendations:

- End-to-end simulations with realistic subsystem responses and material budgets, and complete track finding and reconstruction should be developed.
- Acceptances, efficiencies, and systematic uncertainties should be simulated for each of the core measurements.
- For the PVDIS measurements, the viability of the elastic scattering calibration procedure, to determine absolute Q^2 should be demonstrated by simulations for similar scattering angles to those probed in DIS, and with realistic misalignments.
- Bin migration effects should be simulated for the measurements of the sharply rising J/ψ production cross section near threshold.
- The signal and background trigger rates should be simulated for the J/ψ measurements.

Director's Review Issues II

- The dead-time(s) in the DAQ chain should be modeled.
- The development of a simulation framework with realistic reconstruction and analysis should be pursued with high priority and increased resources.
- The development of a simulation framework with realistic reconstruction and analysis should be pursued with high priority and increased resources.
- Having a functional simulation and reconstruction routines as soon as possible should be a high priority in the software effort. Such software will pay off many times over in experimental design and avoiding pitfalls.

Director's Review Issues III

- Complete radiation calculations to determine activation and absorbed dose on components of concern and mitigate as appropriate
- It should be confirmed that the baffle design, including the support structure, is optimized for background rejection and signal acceptance. Furthermore the baffle design should minimize generation of secondary backgrounds.

Director's Review Issues Summary and Response

- Overall - Restarted dedicated bi-weekly simulation meetings
  - Interleved with SIDIS-specific meeting
  - Has been well attended by working groups
  - Complementary to Ole's bi-weekly software meeting
- End-to-end Simulations
  - Starting with existing GEMC/libsolgemc framework
  - INFN GEM digitization was integrated with general post-processing library years ago
  - Zhiwen is working on broading with other detectors
  - Long term simulation needs being explored by software WG and in pre R&D request

Short Term $\sim$ year

Director's Review Issues Summary and Response II

- Systematics for all experiments
  - Individual experiment spokespeople have been contacted for dedicated manpower
  - Short-term systematics assignment
    - SIDIS (with CLAS and SBS comps) - Tianbo
    - PVDIS - Rakitha (backgrounds), Rich (calibration, baffles), Rob Michaels (calibration)
    - J/ψ - Zein-Eddine and Student
- Background generators are high priority being explored with Rakitha
- Radiation/activation addressed by simulations with Lorenzo
- Detector and baffle optimization need to be demonstrated
- Continuing algorithm development - Ole and Weizhi with pre R&D request
- Simulating to DAQ - Yuxiang at SBU with preR&D request

Short Term $\sim$ year

Pre R&D Request

Lots of big tasks ahead which require new dedicated workforce

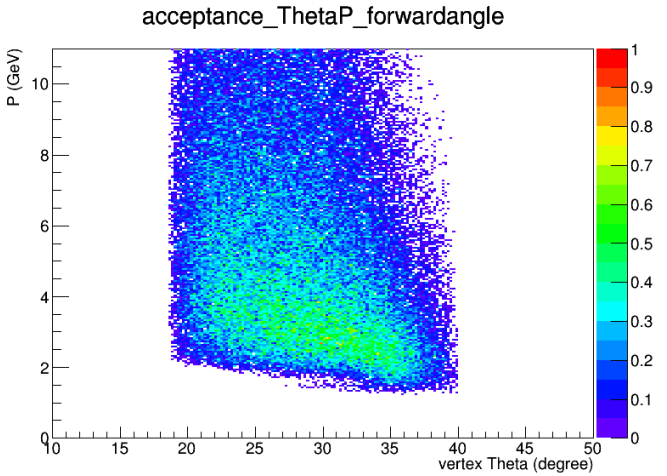
- Envisioned 4 postdoc FTEs - scaled back to 3
- Strong tie-in with general software efforts
  - Coherent simulation and software development - particularly end-to-end and simulation/analysis framework interface
  - Algorithms and tracking - development and testing with simulation
  - Immediate needs for background evaluation, configuration optimzation, code maintenance
  - Simulation directly relating to DAQ, analysis framework
- Institutions making the requests:
  Stony Brook (1.5), Duke (1), Temple (0.5)

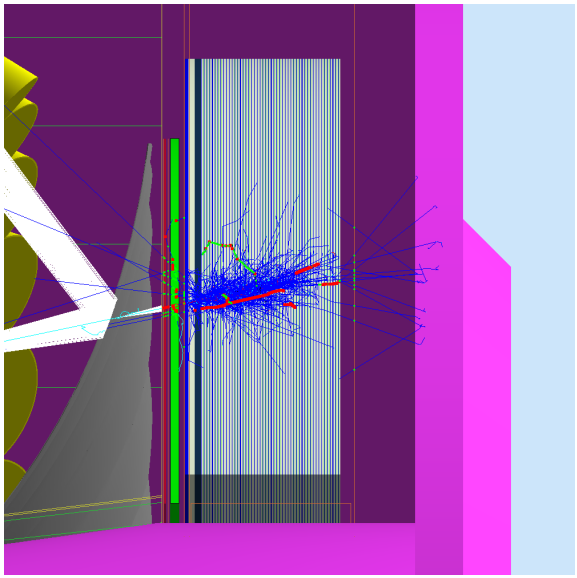
Short Term $\sim$ year

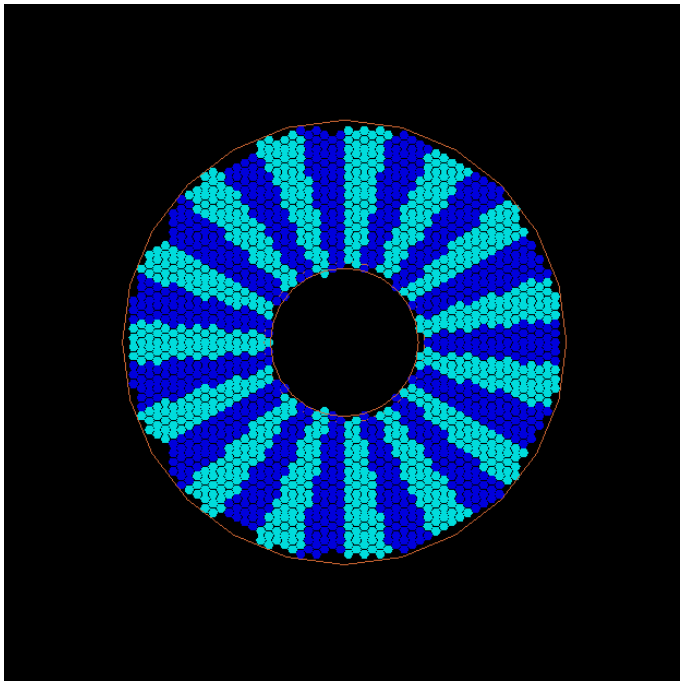
General Simulation

Zhiwen working on new detector acceptances, representations, and responses

- Acceptances for all experiments
- FACal layout and SIDIS Triggers
- MRPC Backgrounds



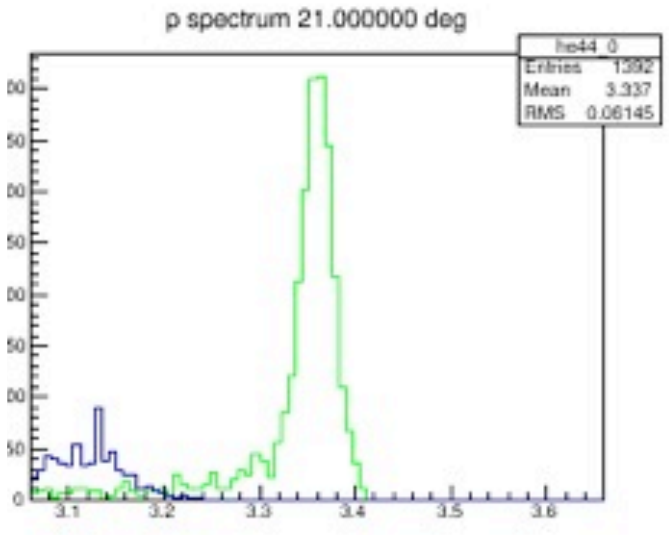


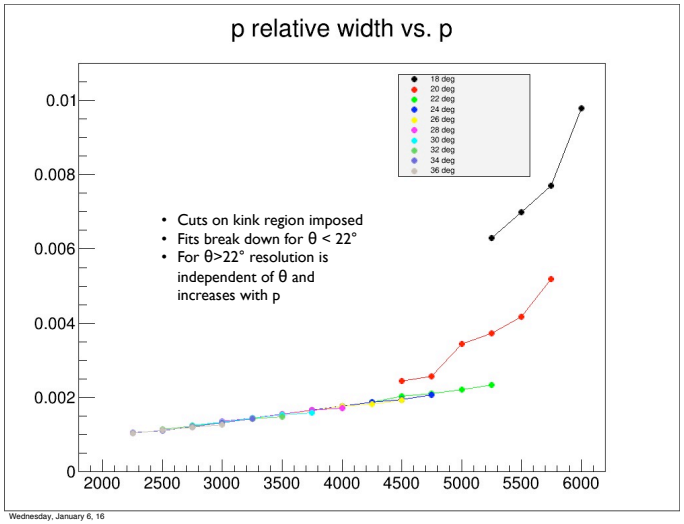


General Simulation II

Rich Holmes and Weizhi continuing with calibration and resolution issues

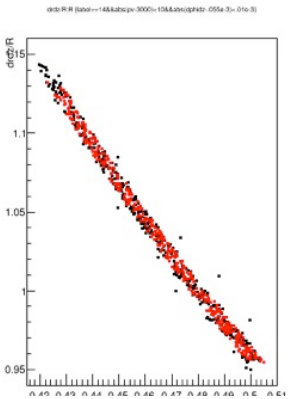
- Doing general fits between GEM hits in chambers
- Including MS (in progress) and smearing with detector resolutions
- Finds elastics are well separated from inelastics
- Multiple scattering contributes several to $\delta p/p$





4.4 GeV elastics at p ~ 3 Gev

Δr/r vs Δr



Δϕ vs Δr