eRD6 Tracking Simulation Tools

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(For the eRD6 Consortium)

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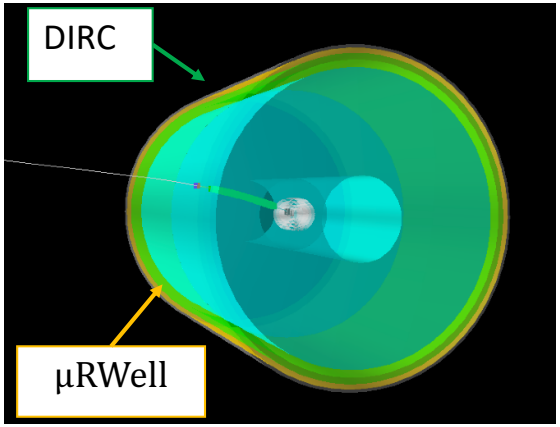
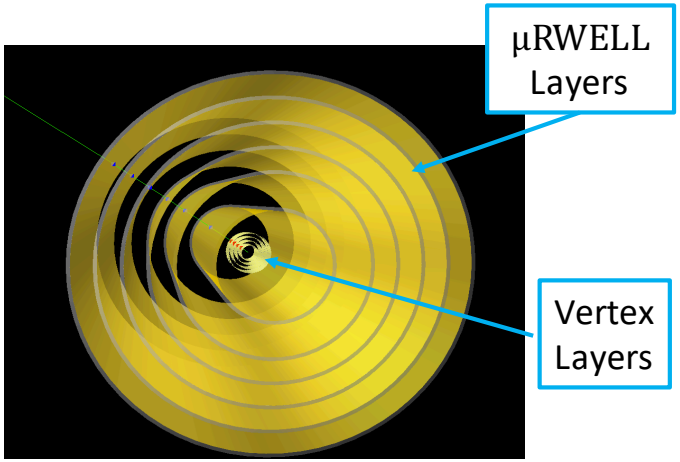
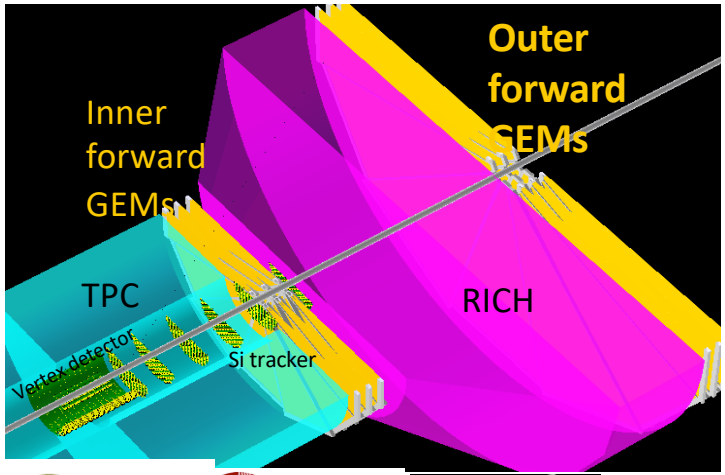
Tracking Simulations

- **Simulations** (FIT, TU)
  - Actively involved in tracking performance studies of central (cylindrical MPGD trackers and TPC) and end cap (MPGD trackers) regions, currently done in EicRoot
  - Will contribute to the tracking simulation of the Yellow Report in these areas.
    - Markus Diefenthaler extended an invitation to work with the respective EIC software (Fun4all/g4e) experts help us implement our tracking detectors into that software.
    - Temple has already set aside travel money for this effort.
  - What are the tracking simulation software needs?







Tracking Simulation Needs

- Simulation Needs
  1. Various types of digitization schemes supported by the track fitting code
     - TPC
     - X-Y (planar trackers, i.e. GEMs)
     - Z-ϕ (cylindrical trackers, e.g. cylindrical $MPGD$)
  2. Track fitting code should available and usable
     - No hard coded detector lists or sensitive volumes
     - Automatic geometry match along the simulation -> digitization -> reconstruction chain
  3. Symmetric access to simulated (truth) and reconstructed quantities
     - e.g. track parameterizations at various locations
  4. Material scans
  5. Easy to use vertexing
  6. Suite should be modular so swapping detectors in and out does not require a lot of effort such as making changes in multiple places and needing to constantly recompile.
- Centrally Managed EIC Software: Fun4all and g4e
  - Do either of these software packages meet the simulation needs above?
    - If so, which ones?
    - If not, can they be implemented and on what time scale?

eRD6 Yellow Report Contribution

- eRD6 Yellow Report Contributions
  - eRD6 has been very active and successful in EIC related gas tracking and PID R&D.
  - Eager to continue R&D efforts.
  - We will contribute to gas tracking simulations in central/end cap regions
  - Level of engagement and commitment is hard to assess without more specific task list.
- Can we generate a semi-specific list of items that we need for the yellow report?