Simulation Status and Tasks

Zhiwen Zhao

Seamus Riordan

Simulation Software

- use JLAB_VERSION=1.3 with Geant4.10.01.p03 and GEMC 2.3 for PreCDR update
- skip JLAB_VERSION=2.0 with Geant4.10.02.p02 and GEMC 2.5
- Test GEMC 2.6
  - CAD import
  - Fast MC mode
- GEMC 3.0 is under work
  - multithreading at event level
  - Hit process as plugin
- How current simulation will work with art? (Zhiwen, Ole)

https://gemc.jlab.org/gemc/html/documentation/releases/roadmap.html

General

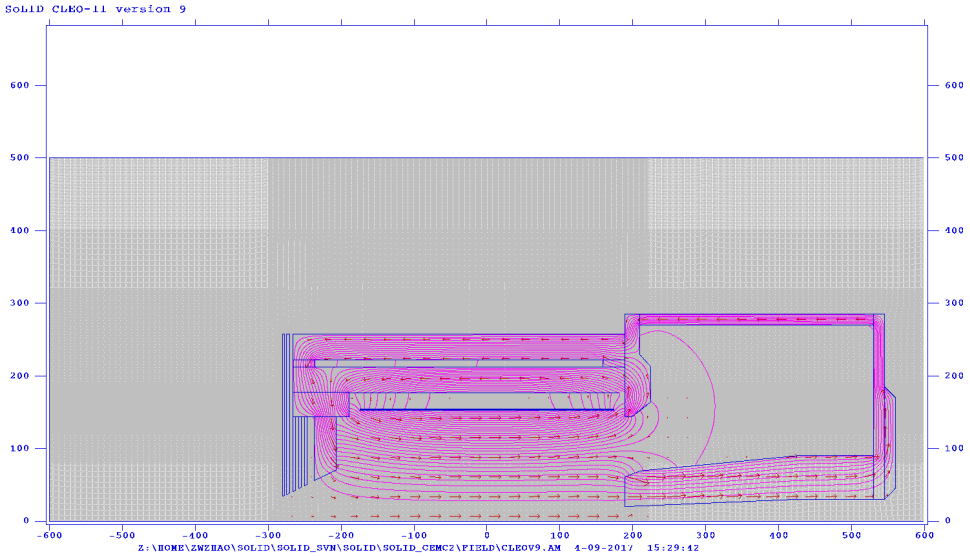
- Move software from svn to github (Zhiwen,Ole)
- Move setup to new magnet and new location (Zhiwen)

Event generator

- Internal and external radiative effects (???)
- Check “solid_bggen” (based on hallD code) rate from He3 cell glass window (???)
- check and compare Yuxiang's inclusive ele generator and “eicrate” (Seamus)

Magnet

- A 2D map is made as a start
- make a 3D map from Jay's new Opera model (Zhiwen, Jay)
  - Format checked
  - Need to make the map when modeling done



EC

- Has ANL layout and energy deposition in modules
- add Birk effect in scintillator, add photon statistics (Ye Tian, Zhiwen)
- Study EC trigger for SIDIS and Jpsi (Ye Tian)
- Simulation for beam test (Ye Tian)

GEM

- Optimize for PVDIS (???)
- Optimize for SIDIS and Jpis setup (???)
- Add layout and dead area (???)
- Optimize digitization code (???)
- Resolution with background for PVDIS,SIDIS H3, Jpsi (Weizhi)
- Simple document with howto (Weizhi)
- SIDIS NH3 tracking (???)

LHC and HGC

- Tuning for new location
- Add more details

  (Zhiwen and Michael)

MRPC

- Has energy deposition in layers, has initial digitization
- Finish digitization verification with data (Sanghwa)
- Iterate to improve simulation if needed (Sanghwa and Zhiwen)
- Finish occupancy study (Sanghwa)
- Study trigger condition and trigger response (Sanghwa)

SPD

- add Birk effect in scintilator, add photon statistics (Sanghwa, Zhiwen)
- Finish occupancy study (Sanghwa)

Other studies

- Trigger study
  - Jpsi 3e in more details (Zhiwen)
  - NH3 (???)
- DAQ (need a detailed plan)
  - Deadtime (???)
  - occupancy
  - Cerenkov readout
  - MRPC readout

- PVDIS acceptance optimization with new magnet (Rich,Zhiwen)

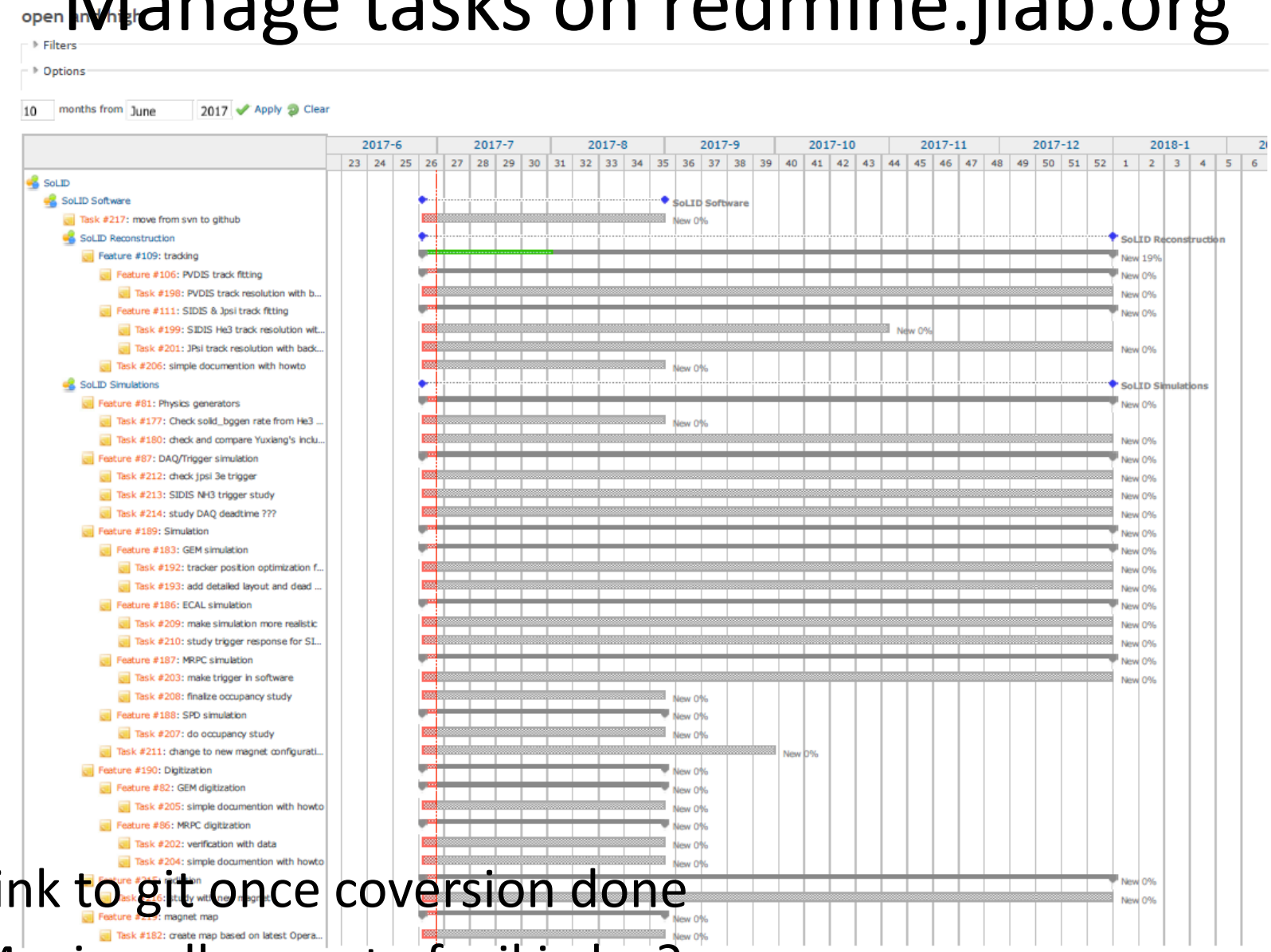
After new magnet

- more documentation with code checked in for any major physics result, so that it can be repeated after new magnet
- All studies need to redo or recheck, major ones below
  - Acceptance (Zhiwen,Rich)
  - Efficiency (Zhiwen,Rich)
  - Baffle (Rich)
  - Radiation (Lorenzo)
  - Trigger (???)

Digitization and reconstruction

- Digitization (keep it independent of simulation)
  - MRPC and GEM digitization are most advanced, they are after simulation. For other detectors, we could do the same
  - In simulation, Cerenkov record photons, SPD and EC record energy deposition, then in digitization, convert Cerenkov,SPD,EC to number of p.e., unless it can't be separated
  - This would save a lot of simulation time
- Reconstruction
  - We have simple code to produce some plots and numbers
  - Need to look into how to do it with art
- Both
  - Keep code modular for different detector, algorithm and file format

Manage tasks on redmine.jlab.org



- Link to git once coversion done
- Moving all or part of wiki also?

Priority

- Urgent
  - PVDIS acceptance optimization with new magnet (Rich,Zhiwen)
- High
  - LGC and HGC tuning for new location (Zhiwen,Michael)
  - New field map (Jay,Zhiwen)
- Medium
  - How current simulation will work with art? (Zhiwen,Seamus,Ole)

if only 1FTE can be requested (need discussion)

1. 0.25 simulation of Jpsi (trigger and physics)
2. 0.25 simulation of SIDIS He3 and NH3 (trigger and physics)
3. 0.25 tracking
4. 0.25 detector definition service and reconstruction in art