Notes from LArSoft Coordination Meeting on Aug 25, 2015

Attending: Brian Rebel, Laura Field, Lynn Garren, Marc Paterno, Tyler Alion, Gleb Sinev, Tom Junk, Herb Greenlee, Alex Himmel, Erica Snider
Remote: Mike Mooney

Release and project report (Erica Snider)

- Based on recommendation of GEANT4 group in preparation for simulation profiling project, LArSoft project recommends migrating from v4.9.6 to v4.10.1p02 as soon as possible
  - Reasons include the poor modeling of low-energy physics, which will affect showers, etc.
  - **Action**: Request feedback from experiments on whether they agree to this, and if so, the timescale on which they could be ready.
    - Erica will send email requesting response

Architecture report (Erica Snider for Gianluca Petrillo)

- Discussion of various ways to change the event display. All approve of the improvement in drawing time
- **Action**: users to test the new code, currently on branch lareventdisplay/feature/gp_FasterDigits
- Changes to be merged within the next two weeks.

Space charge simulation for DUNE 35t (Mike Mooney)

- SpaCE (for Space Charge Estimation) program dedicated to simulating drift distortions due to space charge effects
  - Stand-alone program (depends on ALGLIB for interpolation)
  - Can take input laser tracks or cosmics and estimate distortion map
    - Can therefore be used for calibration
  - The program currently lives in private area
    - **Action**: push the code to GitHub as soon as possible.

Clean up the code later.

- The SpaceCharge service used by LArVoxelReadout to introduce distortions into the simulation
- The code is in larsim/feature/mrmooney_spacechargeupdate
- Issues discussed
  - Hard coded cut in simulation that determines whether to simulate space charge effects
    - Current set to 50 cm, so any TPC < 50 cm will have not SCE simulation
  - New parameter “EnableSCE” to turn on/off. Default is off.
  - The SpaCE program currently lives in private area
  - New parameter “CoordinateType” takes values “1” and “2” to distinguish coordinate systems of uBooNE and 35t, respectively
- **Actions**
  - Introduce a fhicl parameter to replace the 50 cm cut
  - Re-name the “EnableSCE” parameter to something that makes it more clear that it pertains to space charge effects
  - Put SpaCE program into publicly accessible repository as soon as possible. (MM plans to put it into GitHub) Clean up the code later.
  - Implement a different method for handling the coordinate type. In particular, ensure that the code that goes into LArSoft is not detector specific
- **Merge approved pending the above changes** (except for packaging the SpaCE program in GitHub, which can be done later) with the following restrictions
  - If these changes can be done within a week, then wait until completed before merging.
  - If not, then merge current code along with commitment to follow-up with the changes suggested.
  - In all cases, Erica empowered to approve the follow-up
- Erica to talk to Mike after the meeting
  - [Meeting notes:
    - Decided to use a service interface where the initialization of the scale factors becomes a pure virtual function

- Handling the other side of the APA in 35t requires knowledge of the TPC. This would seem to suggest that the method that returns the offset needs to be experiment-specific also.
- Mike will work on this solution, and present it to Erica (at least) for review
- Current time commitments imply this is unlikely to be completed in a week, so he'll commit what he has now, and follow up with the service interface solution
- He will fix the naming problem with EnableSCE prior to requesting that Lynn merge the change
- End of meeting notes]

Non-uniform electric fields (Tyler Alion)

- DUNE FD and prototype need changes to deal with various features in the detectors where fields are non-uniform
- Discussion
  - G4Step: energy deposition and position in world coordinates
  - LArVoxelReadout:
    - DriftIonizationElectrons
      - Drift + diffusion
      - Assumes uniform E field
    - No drift from other side of collection plane, or outside of outside APAs, and no drift electrons created / drifted in the anode plane region (i.e., from the field grid to the central ground mesh)
  - TPCGeo needs a TPC active volume in it. Can we make it allow no TPC active volume?
  - Large field distortions near edges of the field cage in various regions, such as near outer edge of anode planes
  - Discussed introducing an abstract class to deal with this
    - Base class detector agnostic
    - Helper servicer interface to choose the correct implementation
  - Also discussed using the distortion map Mike Mooney is using to deal with this

Changes to TrackKalman* algorithm classes (Herb Greenlee)

- Request merge for these changes.
- In lardata, larreco, feature/greenlee_line_surface
- Interface changes, but mostly uBooNE will be affected
- Added support for “line surfaces”
  - More natural representation of hits, more stable ordering as a result
  - Also use wire IDs instead of channel number. This is better for 35t
- No changes by default.
- Also made changes to make better use of PFParticle input
  - No external seeds needed
  - Reduces inefficiency by about 50% (from about 12% lost to about 6% lost)
  - This is the main point of the merge request
- A breaking change, but only called by TrackKalman3DHit
- New fcl parameters need to be added, but the standard fcl config will still work
- **Changes approved for merge into this week’s release**