Status report: electron drift simulation in rotated geometry

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05/04/2017 ProtoDune Sim&Reco Meeting

Task for drift simu in DP geometry

- **Rotation of the horizontal DP** geometry to vertical by modifying the geometry perl script (**done**)
    - srcs/dunetpc/dune/Geometry/gdml/generate_protodunedphase.pl
- GDML files are generated which are loaded into Geant4 and LArSoft separately.
- However, so far the drifting/projection of electrons (from ionisation) for each hit has been done “manually” for X direction in *LArVoxelReadout::DriftIonizationElectrons* assuming SP geometry
    - The code creates clusters of electrons and projects them to the nearest Plane/Wires, assuming hardcoded horizontal X drift direction, Efields, and assumed transverse diffusion, etc. in Y/Z
    - Uses geometrical concepts like distance and direction assuming horizontal direction mainly

Task for drift simu in DP geometry

- Gianluca Petrillo presented his new support code for DP generic geometry (04_29_00) at the March 14 LArSoft Coordination Meeting:
  - https://indico.fnal.gov/conferenceDisplay.py?confId=14033
  - He provides methods/services to determine geometrical quantities/distances/ direction in a detector orientation independent way.
- **Task:**
  - use the new geometry support services and modify the electron drifting/ projection simulation using orientation given by the loaded geometry (instead of hardcoded directions).
  - Test with SP geometry
  - Test with (un)rotated DP geometry
  - Implement the rotated DP geometry for Event Display

Status

- Starting with the Single Phase geometry, swapping to the new geometry methods to obtain drift distances, Cryostat/TPC/Plane IDs, etc give identical behaviour (as expected)

- Testing the Dual Phase unrotated and rotated geometry is ongoing

- The Drifting and Diffusion algorithm itself does **not** need modifying - only the quantities calculated for the (arbitrarily rotated) geometry is being modified

- Thanks for help from Gianluca, Robert and Dorota!