ON A COMMON SIMULATION FRAMEWORK FOR TIMS

UNIVERSITY OF OXFORD

Presents:
Federico Battisti

LAR TO GAR SAMPLE: MOTIVATION AND CURRENT PROCEDURE

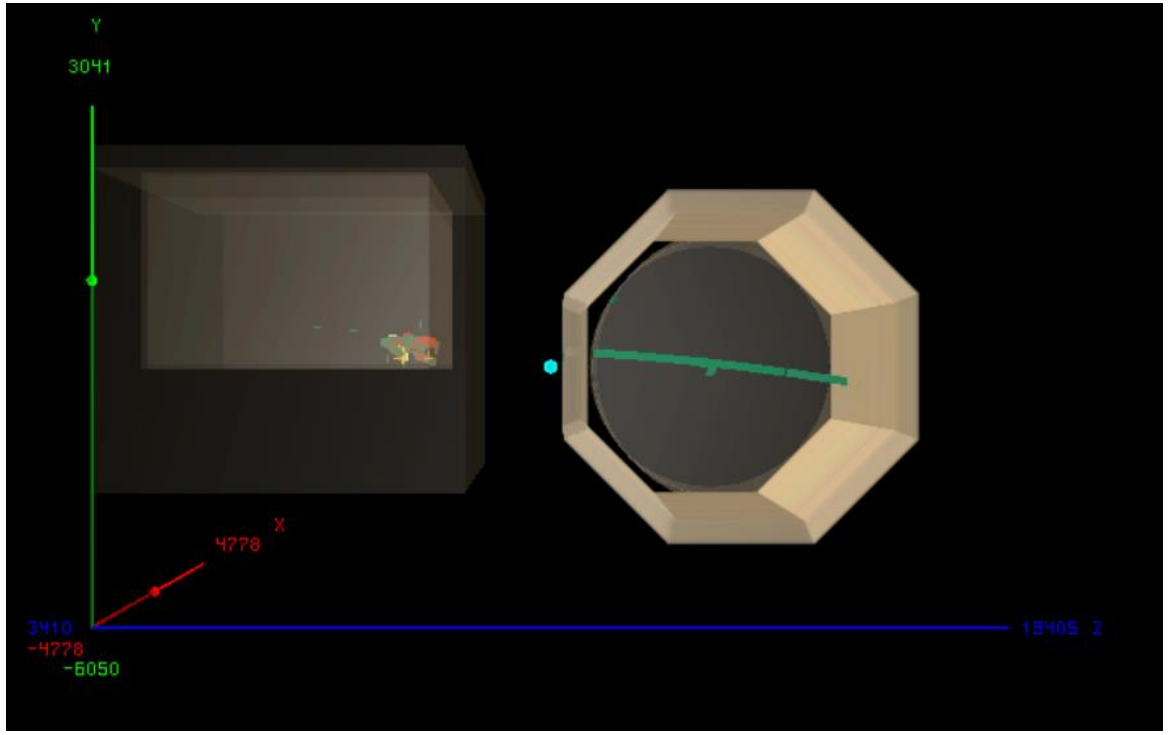
- An important role of ND-GAr will be to function as a muon spectrometer of ND-LAr: to evaluate its capabilities in that sense the LAr → GAr propagation of tracks needs to be very well studied

- The current ND LAr → GAr simulation chain:
  1. Simulate neutrino interactions with GENIE in a ND hall geometry file containing only the liquid Argon detector
  2. Propagate particles using edep-sim in a ND hall geometry file containing both ArgonCube and HPgTPC
  3. Convert edep-sim file to root file readable by GarSoft
  4. Follow the Garsoft reconstruction chain

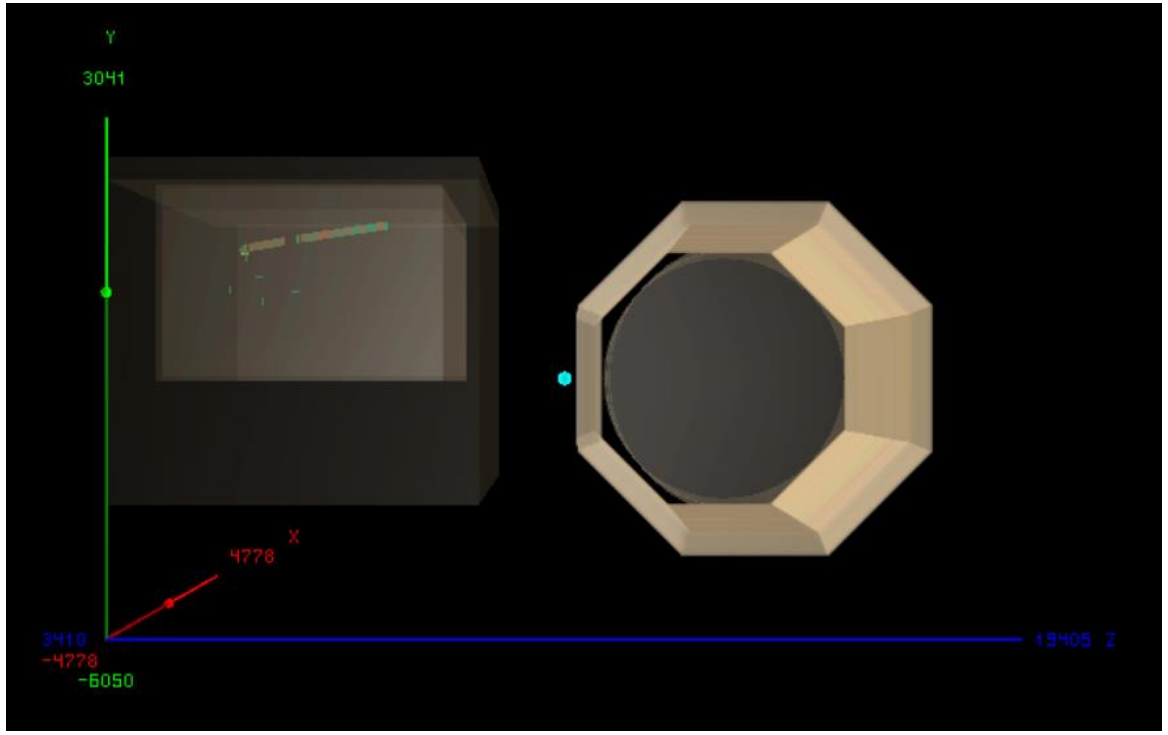
- Recently a wiki has been developed by Eldwan : https://cdcvs.fnal.gov/redmine/projects/dune-neardet-design/wiki/Run_edep-sim_samples_through_GArSoft

LAR TO GAR SAMPLE: AN EXAMPLE

- Two examples of $\nu_\mu(CC)$ interactions in ArgonCube one with a passing muon reaching NDGAr, the other without (both made with edep-disp)



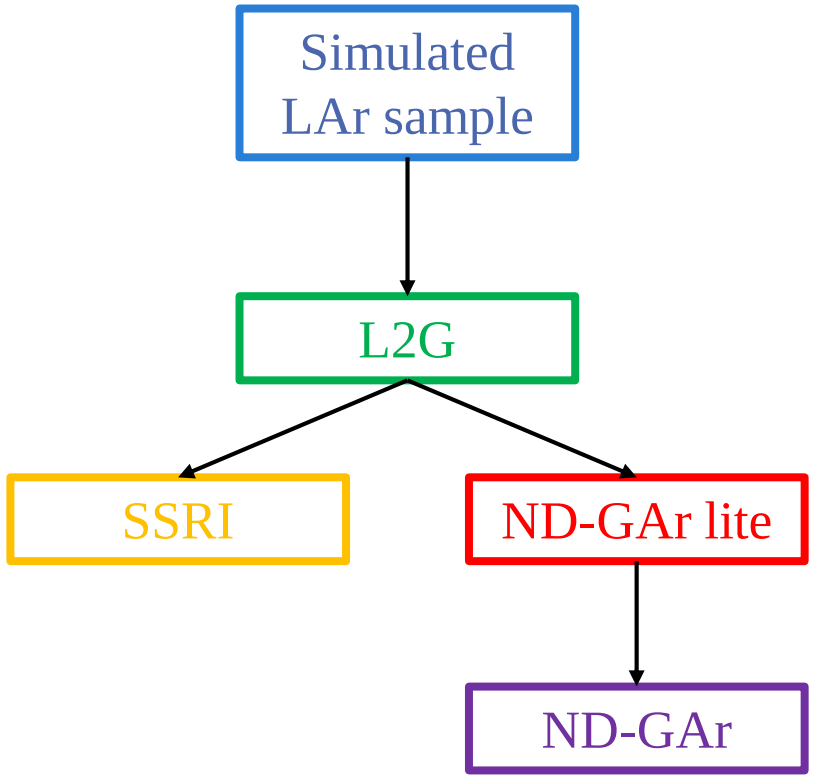
PASSING MUON



NON-PASSING MUON

LAR TO GAR SAMPLE: IMPROVEMENTS

- Strong need for large LAr samples already propagated in edep-sim to test the chain
- L2G: interface that takes outgoing LAr particles and feeds them to edep-sim with any TMS detector could speed up the sample production (Currently starting to work on it with Eldwan towards TMS meeting)
- Constant B-field currently being used (Custom B-field is already implemented in edep-sim/GArSoft)
- Need to improve the track reconstruction and fitting and to integrate with NDLAr



https://indico.fnal.gov/event/44562/contributions/200915/attachments/136745/170170/DUNE_ND_Meeting_28.10.20.pdf

SUMMARY AND FUTURE STEPS

- The $LAr \rightarrow GAr$ simulation chain is up and running, but much larger samples are needed
  - L2G: interface that takes outgoing LAr particles and feeds them to edep-sim with any TMS detector (currently starting to develop with Eldwan)

- In the $LAr \rightarrow GAr$ context reconstruction needs to be expanded to project tracks backwards to NDLAr and connect with the liquid Argon reconstruction information