# Quick Update

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# Geometry: gegede

https://github.com/brettviren/gegede

- Transition to GGD complete (still python)
  - — Don't actually need this package directly
- Define GGD objects with "Builder" modules
- Configure these builders with config file
  - — different config files for different options
  - — sets the builder-subbuilder (volume) hierarchy
  - — different Builder modules for different design of same volume
- Export these to gdml, root, others
  - — already coming in handy
- Internal validation
- Read documentation to start developing:

  https://github.com/brettviren/gegede/tree/master/doc

# Geometry: duneggd

https://github.com/DUNE/duneggd

- Builders: https://github.com/DUNE/duneggd/tree/master/python/duneggd/fgt

  World, DetEnclosure:  Shared between all ND options

  Detector:

  — STT  (STPlane, Radiator, Target)  Halfway done

  — ECAL  (SBPlane, ECALEnd, ECALBarrel)  Das is doing this

  — MuID  (RPCMod, RPCTray, MuIDEnd, MuIDBarrel)  Nitali

- See these builders for syntax examples on

  shapes, volumes, positions, rotations, placements, materials

- Make a GitHub account (free), email me and Brett
- README tells you how to start:

  https://github.com/DUNE/duneggd/blob/master/README.org

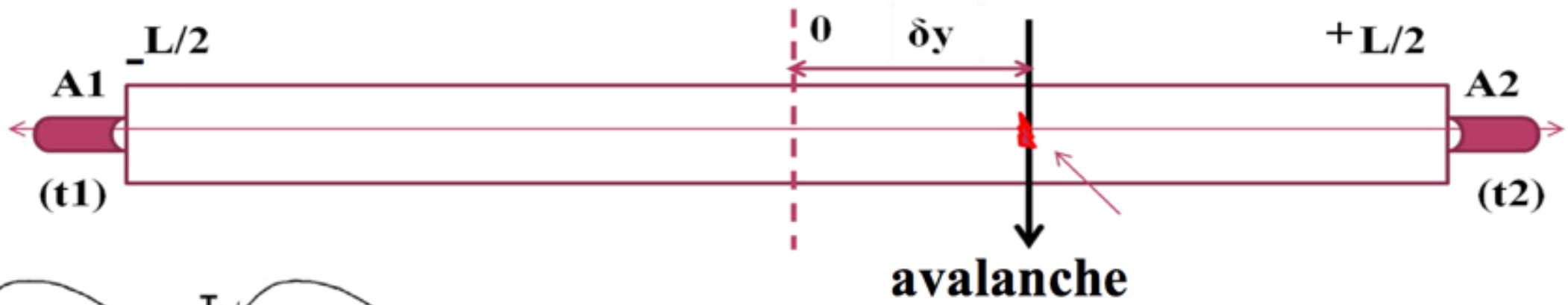
# Detector Electronics

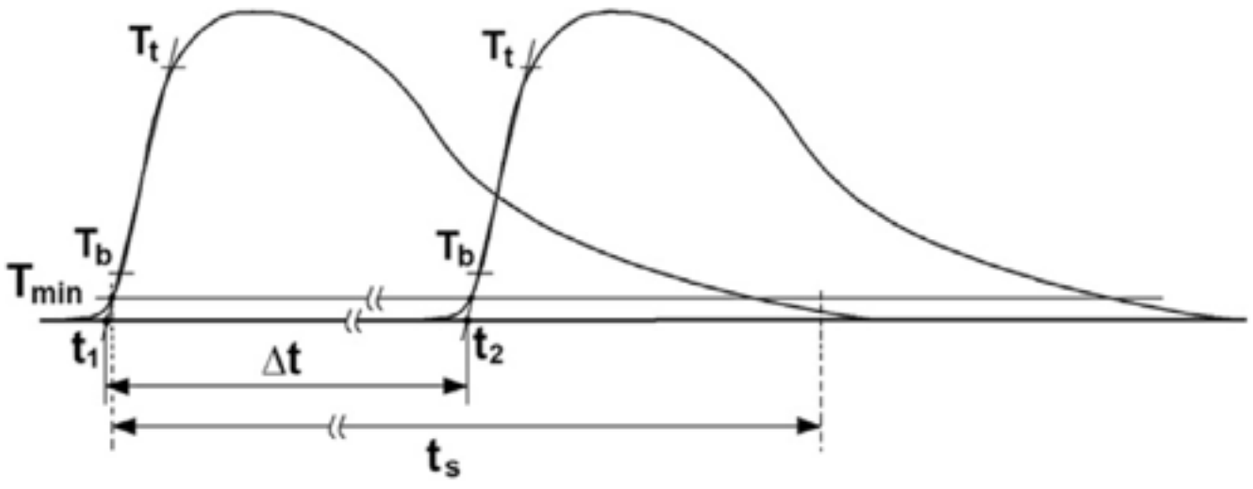
- On hold (other ND options not focusing on this)
- I'll spend a day adding a moot digitization
  - — save the RawDigit products into the event
  - — no convolution, maybe a quick smearing
  - — leave a space for someone to start working in
- still fine if someone out there wants to work on this, needs to be done within a few months

# STT Studies

- Fix geom description (plane positioning is off, missing a few volumes)
- Limit step size
  - I threw an entire week into this and can't seem to get it to work in NuTools
- Transition Radiation — this is a big job
  - Need to write own G4 physics constructor
- Time delay (next slide)
- Calculate average density of tracker (ROOT mass calculation)
- dEdx comparing TR modules with Target modules

The pulses from the outputs of the amplifiers were led Into two channels of a DRS4 ADC which can digitize an input signals and store an amplitude and a pulse shape.




The point of the avalanche is δy from anode center. Signals arriving at amplifiers pass the distance L/2 ± δy, where L is the anode length. So, $\Delta t = 2\delta y/v$, where v is the signal propagation velocity along the anode wire, and the direction from the straw center is determined by the sign. The v = 3.49 ns/m. 1 cm distance corresponds to the difference in the time delay = 69.8 ps.



SPIN

# ECAL Studies

- Soumya has started checking the energy resolution, among other checks
- These plots only consider a piece of the ECAL. Need to look at ECAL as a whole
  - How much does the backward see
  - Energy resolution in backward/barrel

# MuonID Studies

- Once Nitali has some amount of RPC modules arranged around the magnet

  — Doesn't have to be perfect to get started

- G4 User Action already drafted, just need geometry to add it

- Muon momentum resolution

# Neutrino Studies

- Need to wait for stable and sufficient geometry version
  - — GENIE GeomScan takes a long time
  - — configurable to do only once and save work to XML file
- Distributions
  - Momentum/Curvature in STT by particle
  - Energy in 4pi ECAL by particle
  - MuonID? Angular/momentum resolution?

# Event Display

- Still using basic ROOT histograms
- Wide open for contribution, not necessarily critical for a while (not counting geometry visual checks)
- ROOT EVE is a great tool with examples

# What To Learn

- mrb/git: version control
- mrb/cmake: building
- art: data formatting/handling
  - very thorough workbook
- nutools: Generator, Display, and G4 Bases
- dunefgt wiki
  - Hard to document while still so fluid.
  - Best to combine reading wiki, reading the source code, and calling (7045791588), emailing (tylerdalion@gmail.com), or skyping (@tylerdalion) me with any questions
- Example Job: produce 1 single muon event
  - more/better examples to come ★