

---

# Tracking software status

---

Paul Dauncey

# Basic code structure

- Real data: **TBTrackMapper** – raw data to physical hit array
- Simulation: **TBTrackDigitiser** – truth hits to physical hit array
- Common: **TBTrackProducer** – physical hit array to 1D tracks
- Database: **TBTrackDbHandler** – gets required values for tracking
  - (**MapConstants** for TBTrackMapper: dummy at present)
  - **SimConstants** for TBTrackDigitiser: digitisation parameters
  - **AlnConstants** for TBTrackProducer: alignment parameters
  - **FitConstants** for TBTrackProducer: fit error matrices
- Analysers will use the 1D tracks
  - They see exactly the same collection names and structure for all run periods
  - Ideally, differences in efficiencies, resolutions, noise should be modelled (to some approximation) by simulation (when everything is in place)

# For each run period

- **TBTrackMapper** – sort out channel ordering from TDC to physical hits
- **TBTrackDigitiser** – ideally code is common for all simulations (but...)
- **TBTrackProducer** – code is common for all data and simulations
- For database entries
  - **SimConstants** – digitisation (smearing, etc) needs to be adjusted to match data
  - **AlnConstants** – relative alignment and “drift” velocity need to be estimated
  - **FitConstants** – initially approximate to no scattering; later find error matrices from theoretical material estimate or (better) directly from observed scattering in simulation
- Some of these should be iterated (in principle)
  - ECAL is best ruler for measuring “drift” velocity; requires first-order tracking to be done to project onto ECAL to compare
  - Digitisation needs resolution from data; correct resolution determination needs scattering error matrices from simulation
  - Measuring beam spot size in data needs scattering errors; put value back into simulation generation

# What exists right now for code

- **TBTrackMapper**
  - Set up for DESY06, CERN06 (Michele), problems with CERN07 (Paul?), FNAL08 being worked on (Paul)
- **TBTrackDigitiser**
  - Beam line descriptions for DESY06, CERN06, CERN07 in place; may need minor iterations (Fabrizio)
  - Beam line description for FNAL08 is being set up (Fabrizio)
  - Initially, simulation produced with different run periods having different cellId's and different numbers/names of truth hit collections; needs a lot of special-case code
  - This needs Mokka simulation to be done in a uniform way to be removed; being worked on (Fabrizio) but not yet complete
- **TBTrackProducer**
  - Uses common interfaces so no changes needed

# What exists right now for database

- **SimConstants**
  - Reasonable for DESY06, CERN06 and CERN07
  - Smearing and efficiency need iteration for CERN06 and CERN07
  - Placeholder guesses for FNAL08.
- **AlnConstants**
  - Reasonable for DESY06, CERN06 and CERN07
  - Drift velocity for CERN06 and CERN07 needs iteration
  - Placeholder guesses for FNAL08
- **FitConstants**
  - True simulation scattering values for DESY06
  - Theoretical material estimates for CERN06 and CERN07
  - No scattering errors for FNAL08
- To a good approximation, I do all these so a big bottleneck here
  - Help in this area would be very useful and effective

---

# To prompt discussion...

- How accurate does tracking have to be and what are the most important issues?
  - I previously worked on ECAL shower resolution (but no longer)
  - I do not know which analyses will push the tracker data the most
- Track resolution
  - Push for best possible in data? Are scattering errors important? Are different scattering errors for electrons and hadrons important? Should we use the beamspot as a constraint in the fit?
  - How important are systematics (alignment offsets, etc)?
  - Need accurate match to simulation? How critical is material description?
- Track efficiency
  - Are we prepared to work with 3-hit tracks for DESY and FNAL?
  - Need accurate match to simulation? How accurately does efficiency vs position need to be modelled in digitisation?