



Working towards a common D3PD for TRT studies

Ask E. Løvschall-Jensen

PhD fellow

Niels Bohr Institute

University of Copenhagen

Why do we need TRT D3PDs?



Existing dataformats being used

TrackValidationNtuples

These provided all the degree of detail needed for TRT performance and improvement studies.

Loops over tracks and not over event. Not easily combined with eg. GoodRunLists and other packages.

Event-based D3PDs

Studies of tracks associated with reconstructed particles done with various D3PD structures:

TrackD3PDs flags switched on to store TRT hit information (including outliers and in principle holes).

Things we wanted to be able to study with the files

The following is a non-exhaustive list of issues that should be possible to study with these files.

- Calibration of r-t relation [for tracking only]
- Optimization of TRT electron PID [for PID only]
- Tuning of data vs. MC
- Impact of pileup
- Impact of Argon [with p-A collisions only]
- Study of aging effects
- Study of going from 24 to 21 bits [for tracking mostly]
- Easy Early data and MC comparison-studies



Which variables are needed?

The files should be “Event Files”, i.e. one entry pr. collision, with:

- Basic information on both **electrons** and **muons** (incl. trigger).
- Detailed ID/TRT information on **tracks** (down to ~few GeV).

Thus, the files should be much like analysis files, but with detailed **track** info! For now only TRT-minded but extension to pixel/SCT straightforward.

Which (other) physics objects to include:

- Jet reconstruction enabled? yes
- Vertex information yes
- Tau reconstruction enabled? no
- b-tagging enabled no
- Conversion finding enabled no
- etc ...

Variables

Event variables

Standard event variables

- RunNumber
- EventNumber
- averageIntPerXing
- etc.

Track information

Information on a per track basis

- `_n` `_nTRTHoles`
- `_pt` `_nTRTHits`
- ... `_X,Y,Z`
- `_nTRTXenonHits` `..etc..`

Hit information

Information for hits on track and holes

- | | |
|--------------------------------|--|
| - <code>_n</code> | - <code>_driftTimeToTCorrection</code> |
| - <code>_layer_or_wheel</code> | - <code>_driftTimeHTCorrection</code> |
| - <code>_phiModule</code> | - <code>_drifttime</code> |
| - <code>_straw_layer</code> | - <code>_highLevel</code> |
| - <code>_isArgonStraw</code> | - <code>_locR</code> |
| - <code>_bitPattern</code> | - <code>_err_locR</code> |
| - <code>_leadingEdge</code> | - <code>_trkLocR</code> |
| - <code>_TOT</code> | - <code>_err_trkLocR</code> |
| - <code>_t0</code> | - <code>_x,y,z</code> |
| | - <code>_trkX,Y,Z (straw)</code> |

Occupancy variables

Variables containing information of the number of tracks per straw

- `trtRDO_countRDOhitsInEvent`
- `trtRDO_countBarrelhitsInEvent`
- `trtRDO_countEndCaphitsInEvent`
- `trtRDO_countEndCapAhitsInEvent`
- `trtRDO_countEndCapChitsInEvent`
- `trtRDO_countdeadstraws`

Full detail:

<https://twiki.cern.ch/twiki/bin/viewauth/Atlas/TrtCentralID3PD>

Samples now available through DQ2

- First version ready - contains most of the desired variables and samples from 10, 11 and 12 data in Zee and Zmumu streams.
- 1) A large sample consisting of all tracks ~ 1 TB
`dq2-ls group.perf-idtracking.data*TRTD3PD.13.09.13.version1/`
- 2) A small sample containing only Z- \rightarrow ee/mumu tracks \sim GBs
`dq2-ls group.perf-idtracking.data*TRTD3PD.13.09.13.version1.SLIMMED/`
- Final samples total size is gonna be of order few TB!
- work in progress on version2 with all variables and on all samples desired - main obstacle is TRT holes



Final sample goals

Data sample/type	Description	Large data format	Small data format	Extended data format
Zee (data+MC)	Zee from LUSL trigger, 2010-2012	Yes	Yes	Only small fraction of data
Zmumu (data+MC)	Zmumu from LUSL trigger, 2010-2012	Yes (first samples)	Yes (first samples)	Only small fraction of data
J/Psi ee (data+MC)	J/Psi ee from Dilepton trigger, 2010-2012	Yes, fraction of data	Yes, fraction of data	Only small fraction of data
J/Psi mumu (data+MC)	J/Psi mumu from Dilepton trigger, 2010-2012	Yes, fraction of data	Yes, fraction of data	Only small fraction of data
High pileup (data+MC)	Runs 206717, 206725, and 206724 with $\mu = 60$	Yes	Yes	Yes
Busy invironment (data+MC)	Heavy Ion data (Dec 2011)	Yes, fraction of data	Yes, fraction of data	Yes, fraction of data
Runs with Argon in TRT (data+MC?)	Proton-Lead (p-A) data (2013)	Yes, fraction of data	Yes, fraction of data	Yes, fraction of data
25ns bunch spacing (data+MC?)	Runs 216399, 216416 and 216432 [period M]	Yes	Yes	Yes
Cosmic data (data+MC?)	e.g. Runs 214303 and 214281 (Nov. 2012)	Yes	Yes	Yes, perhaps fraction of data

Documenting twiki for TrtCentralD3PDs

- **Usage and sample details:**
<https://twiki.cern.ch/twiki/bin/viewauth/Atlas/TrtCentralD3PD>
- **Technical details:**
<https://twiki.cern.ch/twiki/bin/viewauth/Atlas/TrtCentralD3PDProduction>
- **both under:**
<https://twiki.cern.ch/twiki/bin/viewauth/Atlas/TrtWiki>

Thanks...



backup



TrackD3PDMaker

- Adding the athena tool: DriftFunctionTool and service: ITRT_StrawNeighbourSvc
 - TOT correction
 - HT correction
 - board
 - chip
- Removing unneeded variables
 - id (seems to be identical to idDetElement)
 - detType
 - iscompRIO
 - highlevel (bool, but already there with highThreshold)
 - trk_loc_phi/x,y,z as these were not desired geometric variables (perhaps geant4)