Athena & TruthTools

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(AOD) TruthTools in Athena

Packages

- everything under PhysicsAnalysis/TruthParticleID
- McParticleEvent: EDM
- McParticleUtils: framework agnostic objects
- McParticleKernel: component interfaces
- McParticleTools: concrete tools
- McParticleAlgs: concrete algs

python/ARA

- everything in McParticleEvent should be useable from python and ARA (or is at a Reflex dict. away)
- stuff in McParticleUtils could be used
- AFAIK, no component can be used in ARA (except 1)
  - none of them are DualUseTool...

McParticleUtils

- McVtxFilter:
  - select HepMC::GenParticles based on a decay pattern
  - *e.g.:* $'6 \rightarrow 5 + 24'; ' \rightarrow -11 + 11'$
  - loop over GenVertices of a given GenEvent and select the good ones
  - further options:
    - matchSign: differentiate particles from anti-particles
    - matchBranches: strictly matches the number of in-going and/or out-going particles against the decay pattern filter
- McUtils::chargeFromPdgId:
  - quite self explanatory
  - uses internally HepPDT (some problems w/ ROOT)

McParticleKernel

- IMcVtxFilterTool:
  - wrap the McVtxFilter class in a GAUDI component
  - Sc filterMcEventCollection(in, out)=0
- ITruthIsolationTool:
  - compute/retrieve isolation energies (w/ various δR isolation cuts) for a complete HepMC::GenEvent
  - Sc buildEtIsolations(mcEventCollName)=0
- ITruthParticleCnvTool:
  - create a mirror TruthParticleContainer from a McEventCollection
  - Sc convert(in, genEvtIdx, truthparticles)=0
  - the sole tool entitled to **create** TruthParticles !
- ITruthParticleFilterTool:
  - create a new filtered McEventCollection from an input one
  - Sc buildMcAod(in, out)=0

McParticleTools - I

- `EtaPtFilterTool`:
  - filter `GenEvent` according to McTruthTaskForce recommandations
  - see AtlasProtected/MonteCarloTruthTaskForce
  - see AtlasProtected/McEventCollection
  - only include generator particles (default: `False`)
  - keep all generator stable particles (default: `True`)
  - keep all documentaries
  - used in production (ESD $\longrightarrow$ AOD)
- `McVtxFilterTool`:
  - `DoSignalProcessVtx`: keep the `signal_process_vertex` from `HepMC::GenEvent` in output
  - `FillTree`: keep the entire decay tree from a decay vertex
  - `ParticlesToKeep`: list of particles to keep from a decay tree
- `NoopFilterTool`: essentially a `McEventCollection` copier

McParticleTools - II

- `OldSpclMcFilterTool`:
  - filter implementing the old SpclMc filter strategy to only keep *'special'* particles (bosons, mesons, ...)
  - not used anymore in production...
- `VtxBasedFilterTool`:
  - only keep particles which match a (set of) `McVtxFilter` decay pattern(s)
- `TruthIsolationTool`:
  - computes isolations for stable, interacting particles among photons (with $p_T > 0.5\ GeV/c$), leptons (but no documentaries)