Status of MUID

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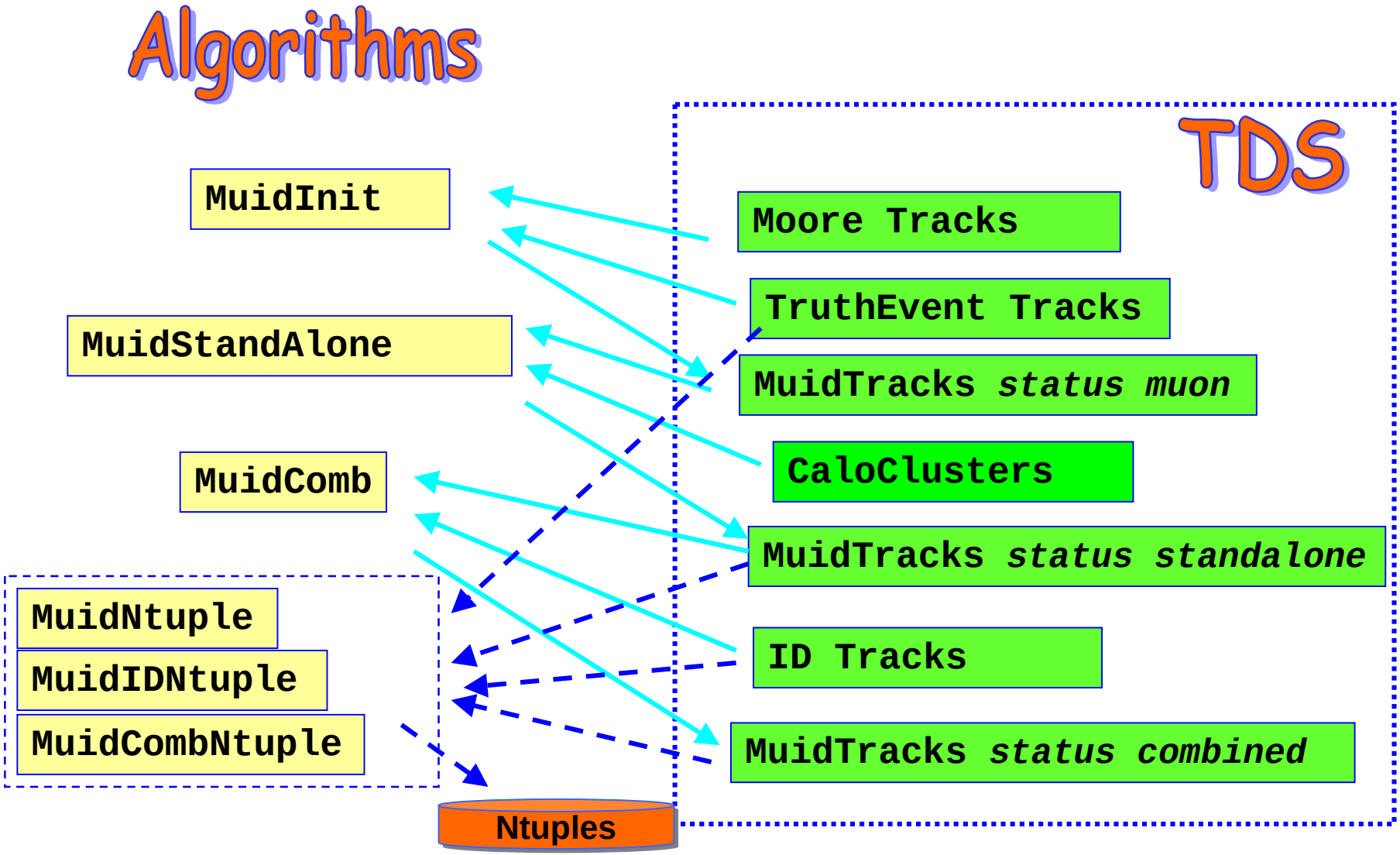
Athena Implementation

- Inputs from Moore, Calo Reco and iPat
- Athena modules:
  - MuidInit :
    - gets tracks from Muon Reconstruction (Moore) and associates the truth from KINE bank
  - MuidStandAlone:
    - muon tracks are propagated to the vertex
    - multiple scattering parameterised as scattering planes in calorimeters
    - energy loss from truth and/or from Calo Reconstruction (Tile, HECLAr and EMLAr CaloCells from CaloUtils/CaloEvent packages) and/or from parametrization in function of (eta,pt)
    - refit at vertex
  - MuidComb:
    - gets MuidTracks from previous step and ID reconstructed tracks (iPat)
    - Muon/ID tracks matches with a χ^2 cut-off
    - Combined fit

Muonidentification – Athena Implementation

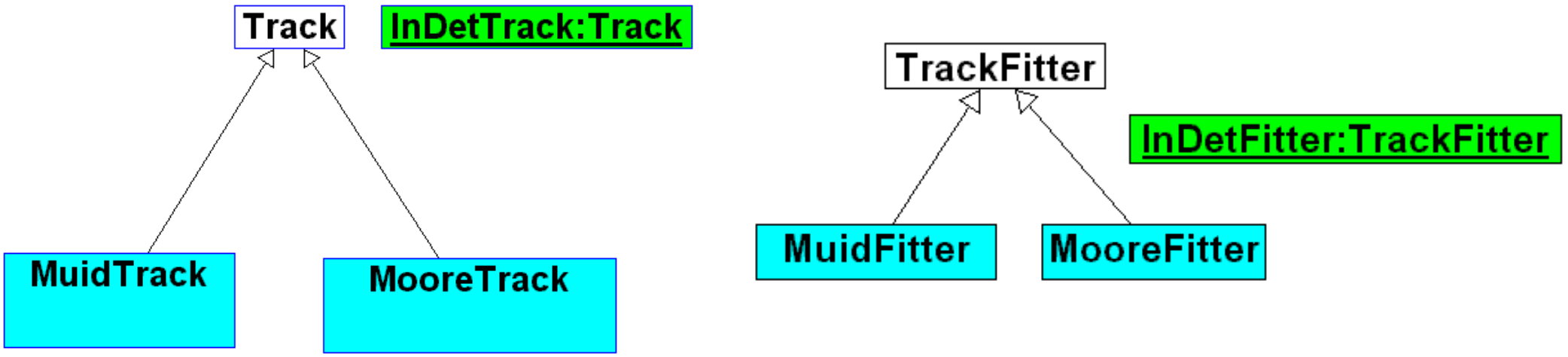


Package Structure and Status

- Under offline/Reconstruction
- Now:
  - MuonIdentification
    - MuonIdentification
    - src
    - MuinCBNT (for ntuples)
      - MuidCBNT
      - src
- Restructuring plan:
  - MuonIdentification (as a container)
    - MuidAlgs
    - MuidEvent
    - MuidUtils
    - MuidCBNTAlgs
- Status
  - Code in my private area.
  - Works in the 5.2.0 and 5.3.0, on both TDR and DC1 data.
  - Plan to release it a.s.a.p.

iPatRec-Moore-MuonIdetification shared classes

- Same Track and Fitter (from iPat)
  - Inheritance relationships

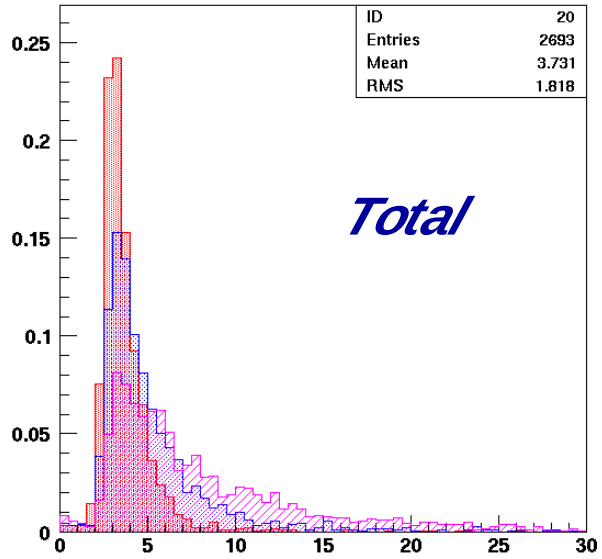


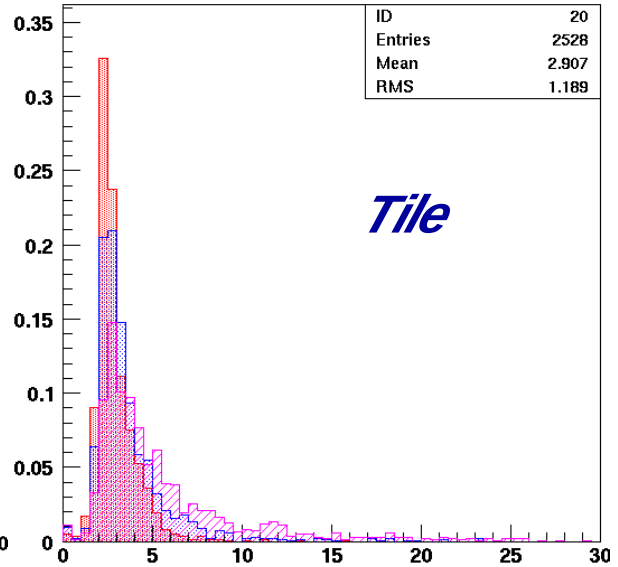
MuidStandAlone - Energy loss in the Calorimeters I

TDR data

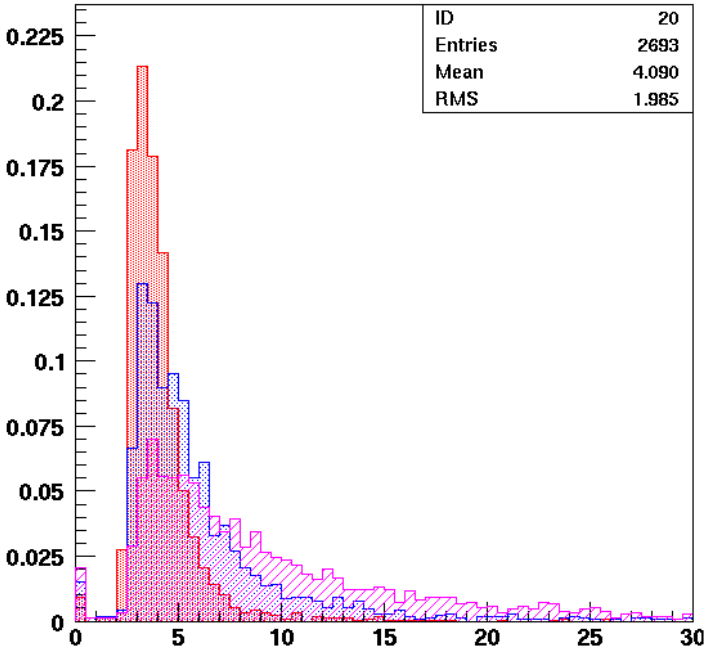
Pt = 20 GeV
Pt = 100 GeV
Pt = 300 GeV

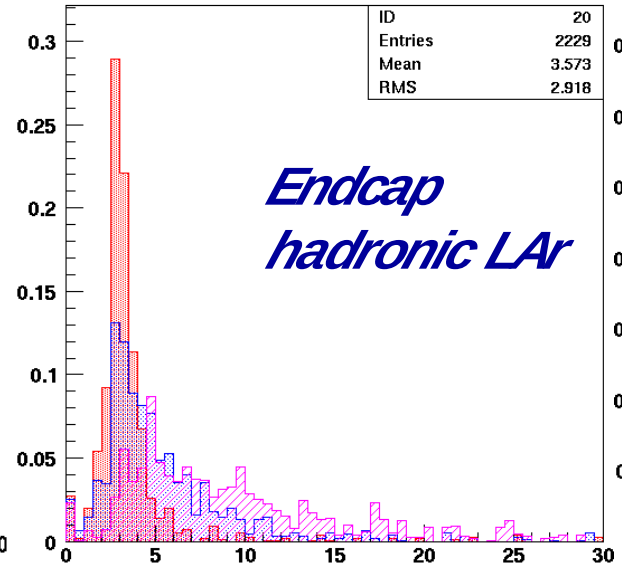
reconstructed (GeV)

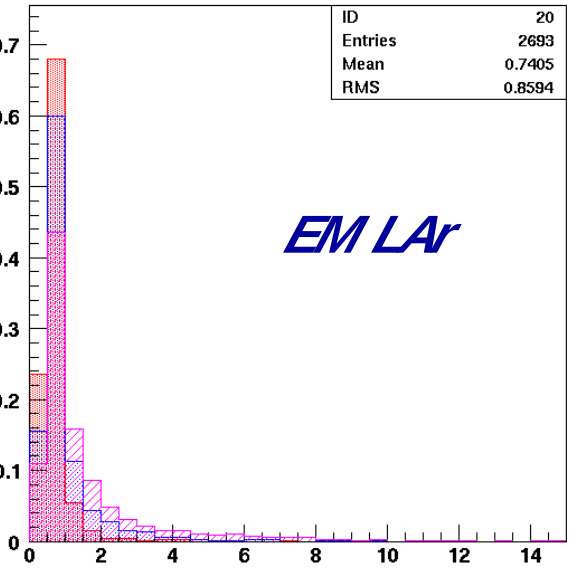




from MC-Truth (GeV)



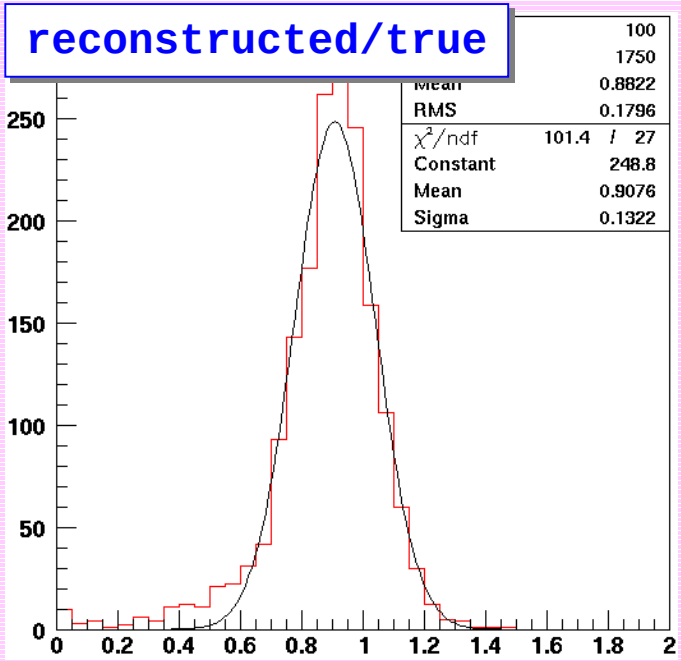




MuidStandAlone – Energy Loss in the Calorimeters II

μ pt=100 GeV

reconstructed/true

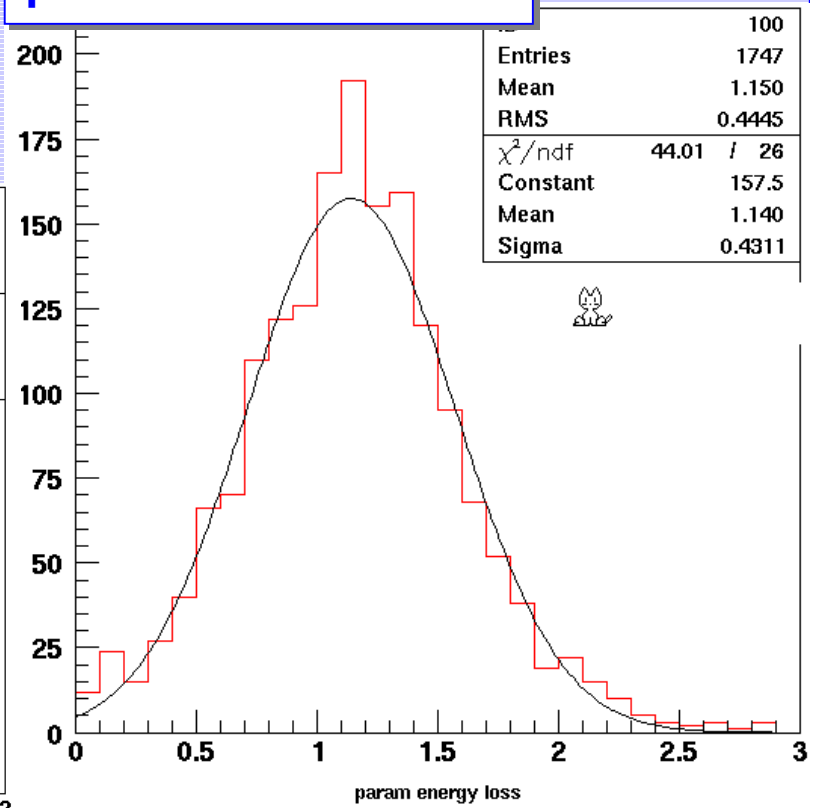


Corrections on energy loss needed

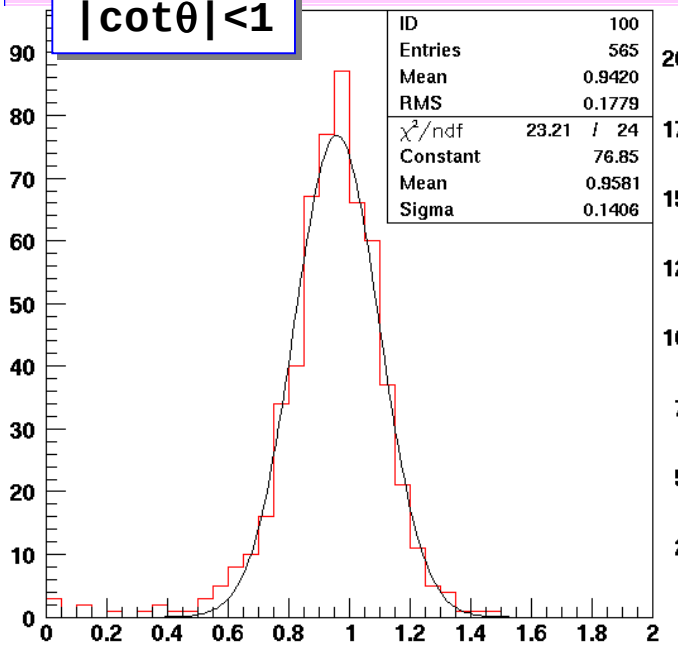
eta-pt dependent

Function from Dimitris: maybe a bug in my implementation… under investigation

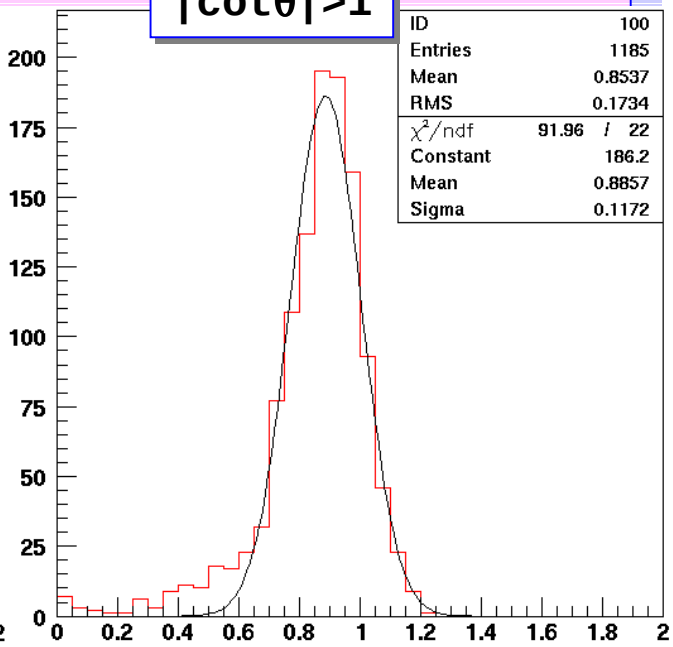
parametrized/true



|cotθ|<1

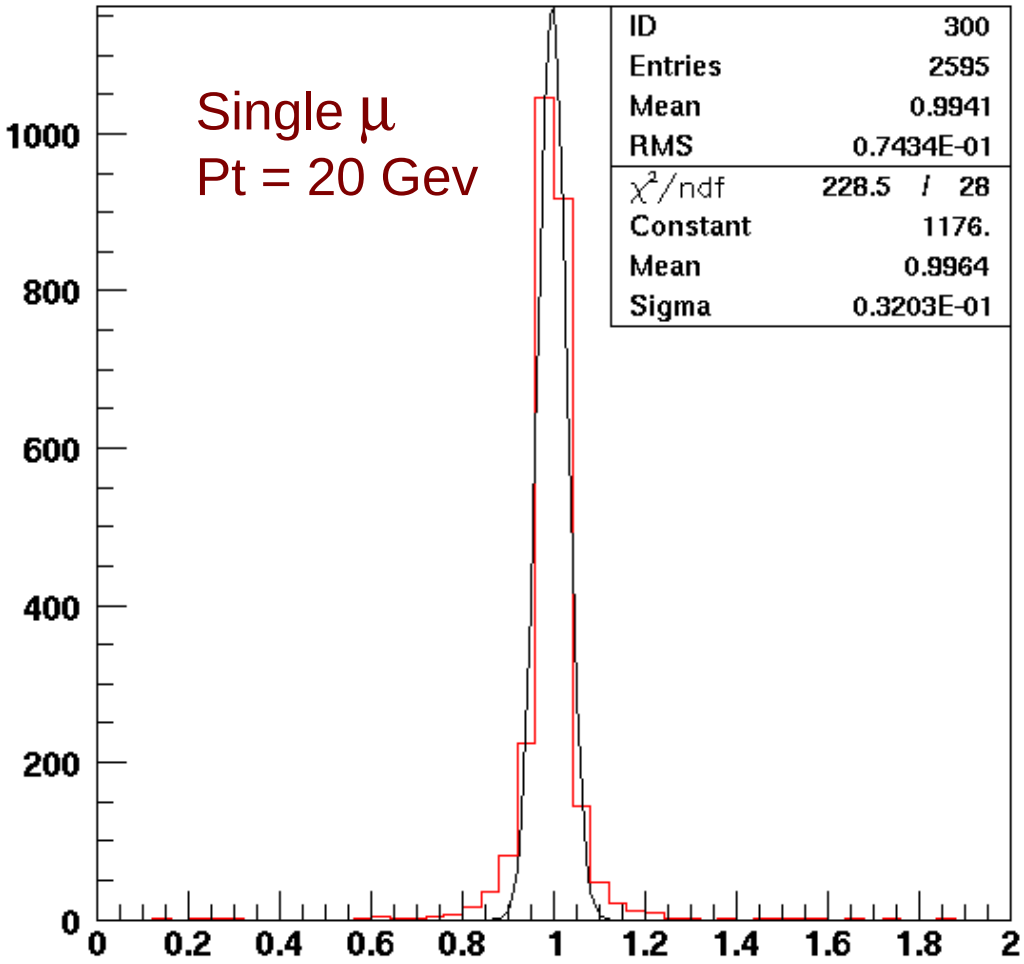


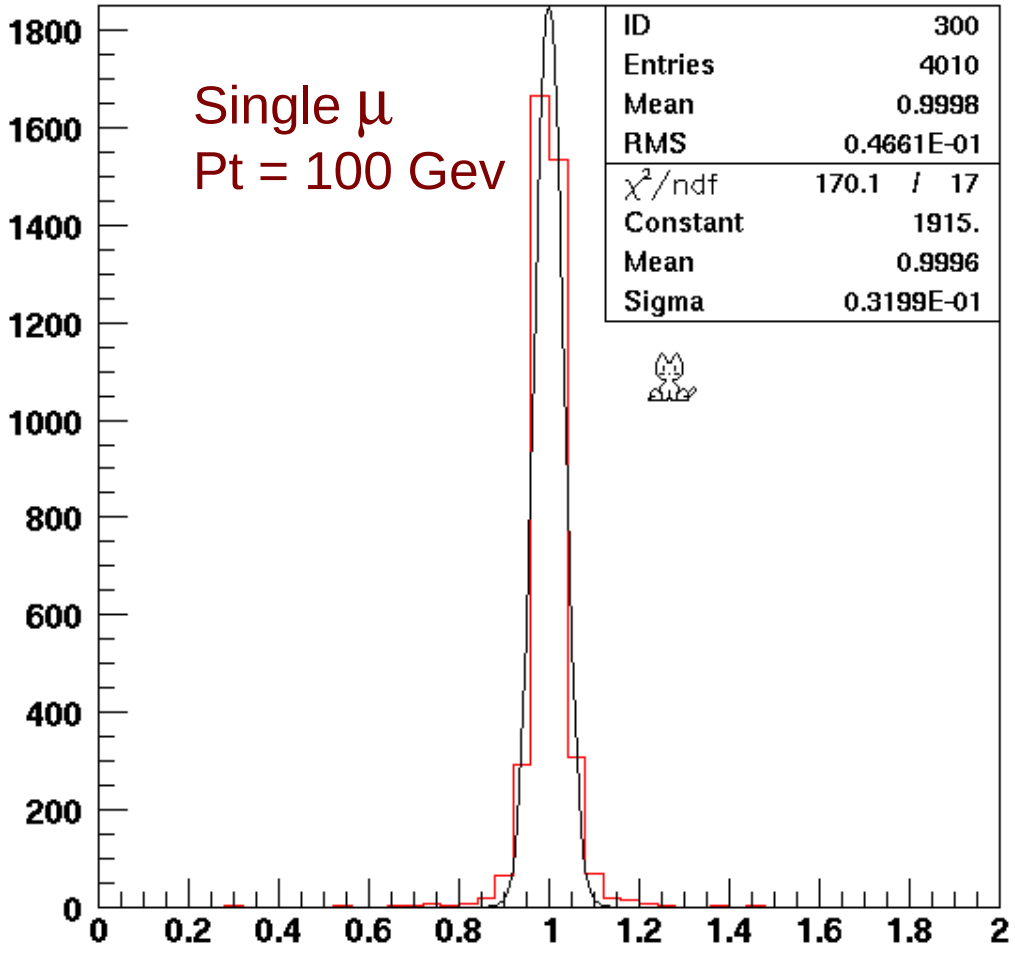
|cotθ|>1



MuidStandAlone – refit @vertex

Pt resolution @vertex

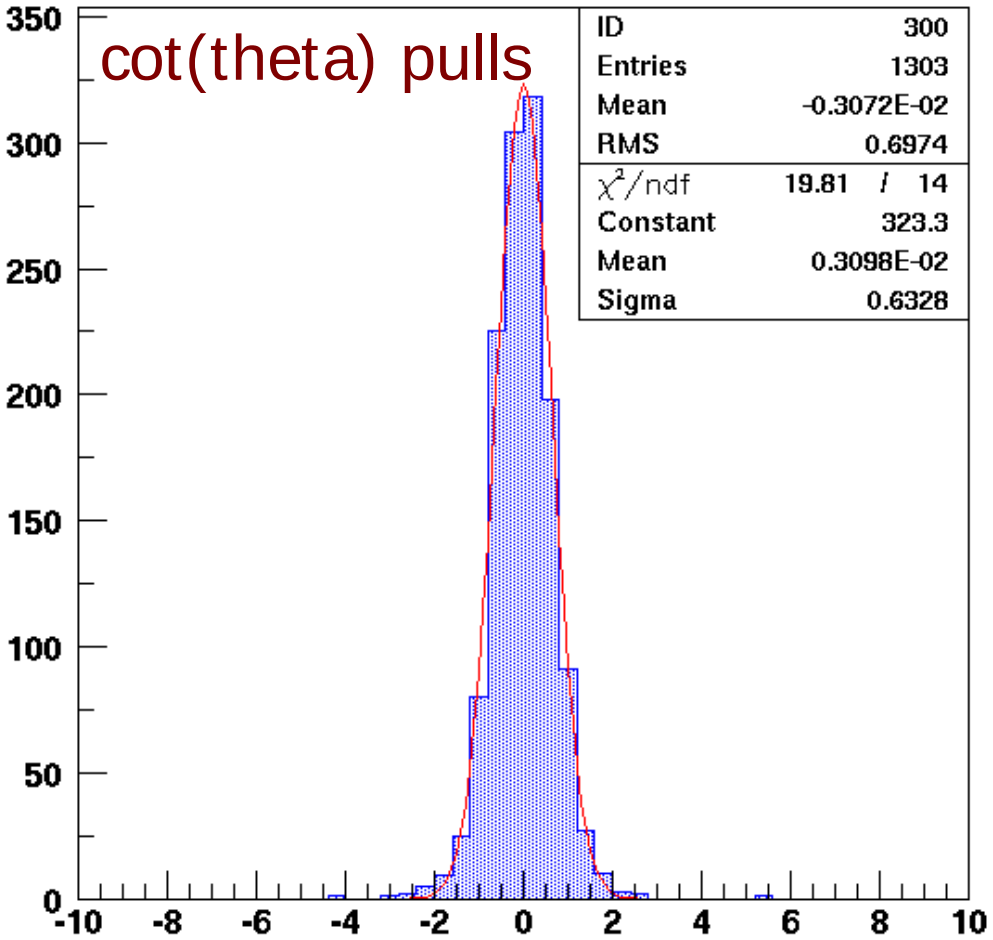


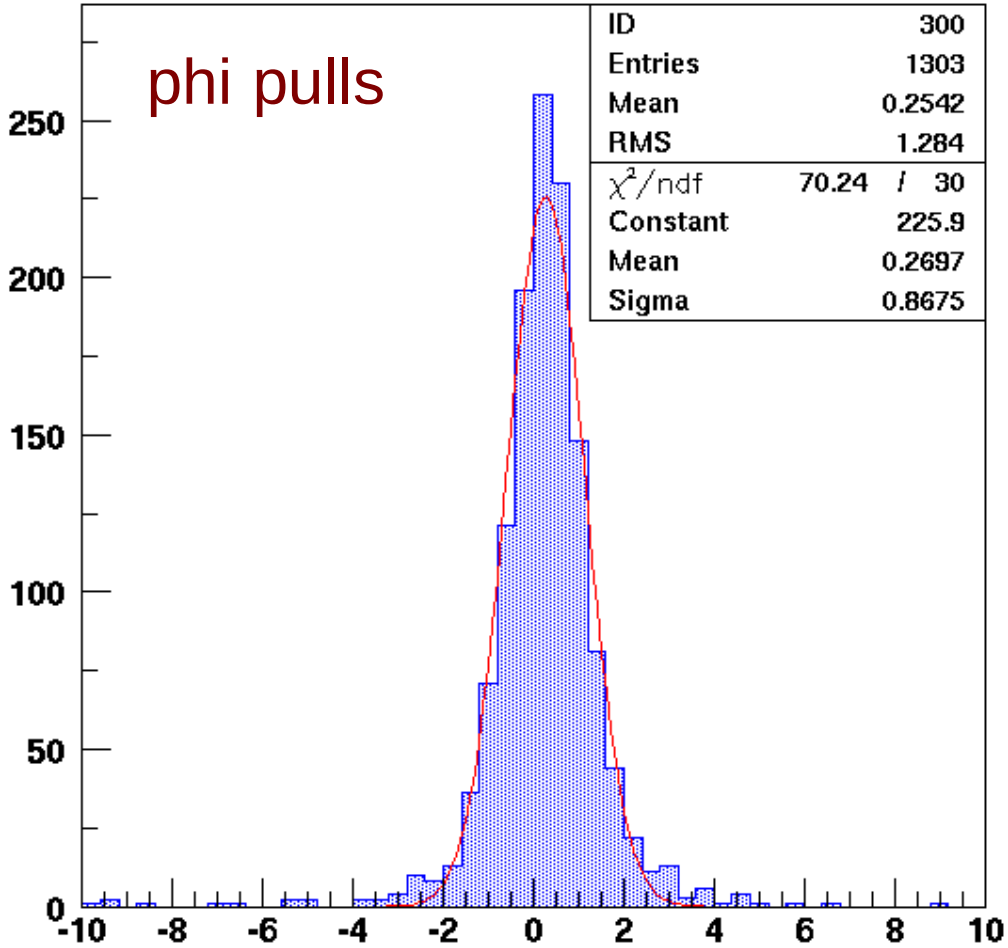


MuidStandAlone – refit @vertex

StandAlone Muid

Pulls @vertex





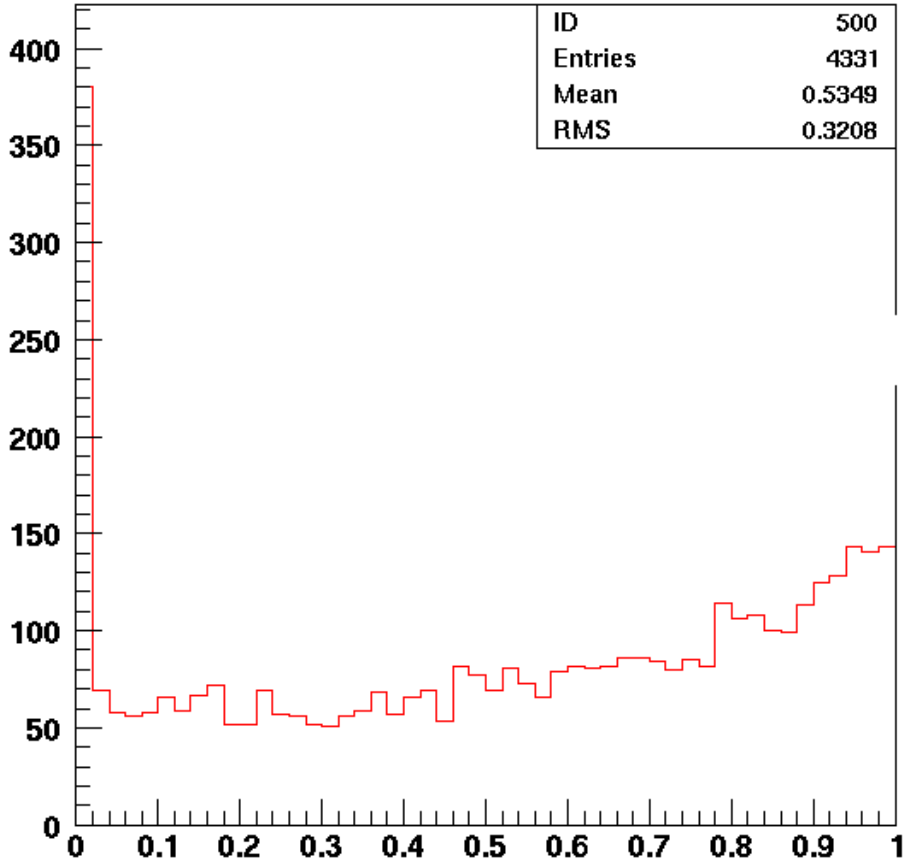
Single μ Pt = 20 Gev

MuidComb Matching Procedure

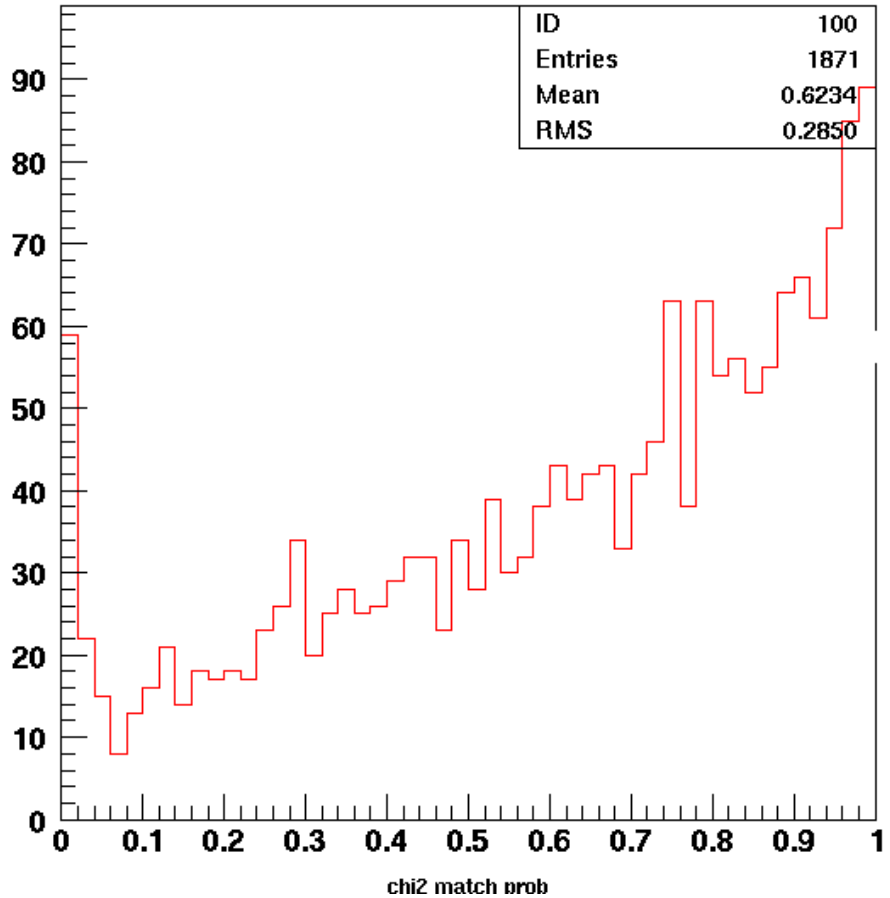
1. A χ^2 cut-off criteria match has been implemented comparing ID and Muid track (@vertex) parameters
2. When StandAlone refit fails (few hits in MS reco) or when there is no good χ^2 match, a comparison between angular parameters of tracks from ID and MS reco is performed and the best match is kept.
3. A "muon like" signal in calorimeters for identification is not implemented yet.
    - It would require the access to energy deposition in different zones of hadronic calorimeters

MuidComb – match probability

χ^2 probability with 5 d.o.f.: spike due mainly to the Pt-pull (no dead material description in Moore)



χ^2 probability using only angular parameters

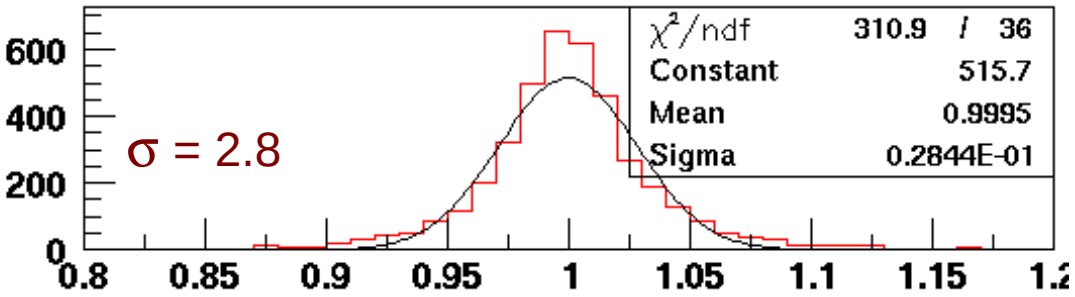


Soon MUID will use new Moore version with material…

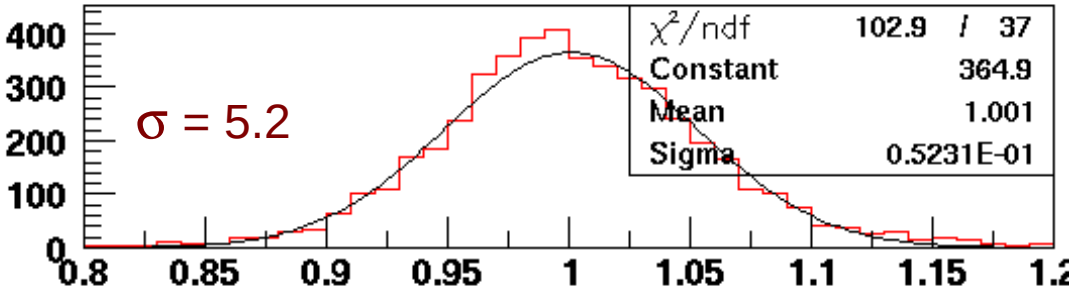
P_T Combination

Pt = 100 GeV

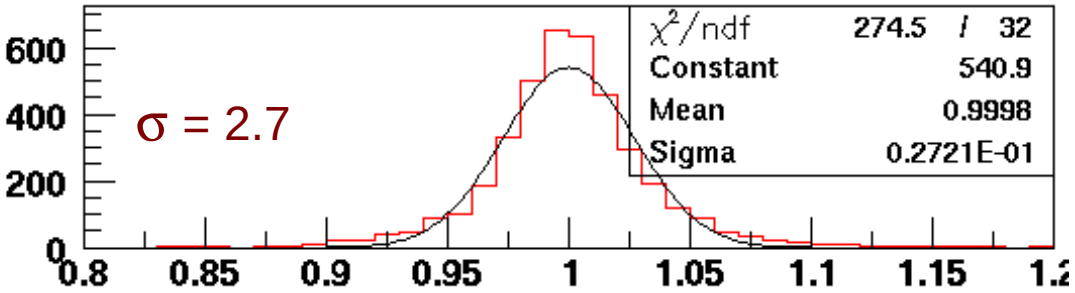
Muon Track (Moore + Calo + Muid)



InDet (iPatRec)



Combined (Muid)



Future plans

- Release the code a.s.a.p.
  - Use of the new version of Moore (dead material)
- Still several check and tuning to do
  - Calo energy loss corrections, calo regions, fitter step in calo region, matching procedure, material effects, multiple associations … bugs!
- Start performance studies