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Collider Mode. Reduced Magnetic Field.

Progress on task 2:

Particle identification determination of spectra using information about the energy losses (dE/dx) in the TPC and the Time-of-flight from the TOF detector.

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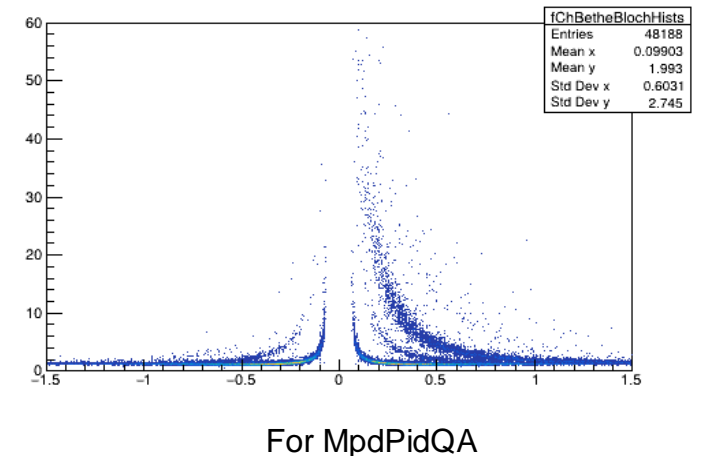
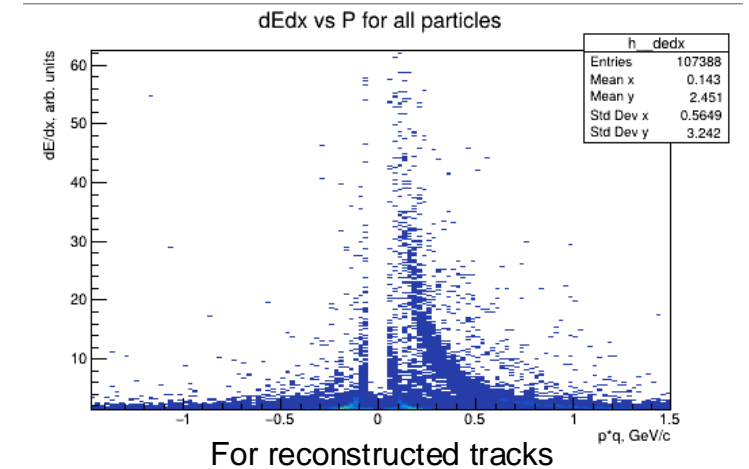
PREVIOUS ACTIVITIES



With the new class created "EnerClass" I obtained:

- "dEdx vs p" Histograms for all particles
- " m^2 vs p" Histograms for all particles
- The implementation of the MpdPidQA class, only for comparing histograms

The data analyzed was "urqmd-BiBi-09.2GeV-mb-eos0-500-0.reco.root", only to test how the class works.



ADVANCES



- The EnerClass class is almost entirely written, although it still needs to specify the cuts in "nHIts", "DCA" and "pseudorapidity", which must be provided by the Collider Mode task 1. Because of this, only the adjustments for unrestricted energy loss distributions have been obtained.
- The data analyzed were "urqmd-BiBi-09.2GeV-mb-eos0-500-2*.reco.root", for 20000 events, even if it is planned to increase the statistic by having the correct cuts.

```
// The main reco loop
int ntr = mKalmanTracks->GetEntries();
for (long int i = 0; i < ntr; i++) {
    MpdTrack *mpdtrack = (MpdTrack *) mMpdGlobalTracks->UncheckedAt(i); // Global track is accessed

    MpdTpcKalmanTrack *kftrack = (MpdTpcKalmanTrack *) mKalmanTracks->UncheckedAt(i); // The corresponding TPC Kalman track is also used
    int kfcharge = kftrack->Charge(); // for the charge
    double p = kftrack->Momentum3().Mag() * kfcharge; // full momentum and
    double dedx = kftrack->GetDedx(); // dE/dx information
    int mcid = kftrack->GetTrackID(); // MpdTpcKalmanTrack::GetTrackID() gives the ID of the
    // corresponding Monte Carlo track

    MpdMCTrack* mctrack = (MpdMCTrack*) mMCTracks->At(mcid); // Monte Carlo track is open for reading

    int pdg = mctrack->GetPdgCode(); // Track PDG code
    int prodid = mctrack->GetMotherId(); // Track primacy: -1 = primary, any other = secondary
    // int current_particle_mc = particle_by_pdg(pdg); // Particle position in the particles vector (read in the
    // settings file)
    float rapidity_mc = mctrack->GetRapidity(); // Particle rapidity (CAN BE WRONG!!!)
    float pt_mc = mctrack->GetPt(); // Particle transverse momentum
    float p_mc = mctrack->GetP(); // Particle full momentum
    float pz_mc = mctrack->GetPz(); // Particle momentum z-component

    //----- Cuts -----
    Theta = TMath::PiOver2() - kftrack->GetParam(3);
    AbsEta = TMath::Abs(-TMath::Log(TMath::Tan(0.5*Theta)));
    nHits = kftrack->GetNoFHits();
    //-----

    if(RECOmID == 1 && mctrack->GetMotherId() != -1) continue; //primary tracks
    if(RECOmID == 2 && mctrack->GetMotherId() == -1) continue; //secondary tracks

    //if ( AbsEta > AbsEtaMax ) continue;
    //if ( nHits < s_tr_nHits ) continue;

    //if ( ImpParMax != -1.0 ) { if ( fncHeader->GetB() > ImpParMax ) continue; }
    //if ( VzMax != -1.0 ) { if ( TMath::Abs( fncHeader->GetZ() ) > VzMax ) continue; }

    pldQA->FillDedxHists(p, dedx, pdg);

    h_dedx->Fill(p, dedx);
    h_m2->Fill(p, mpdtrack->GetTofMass2());

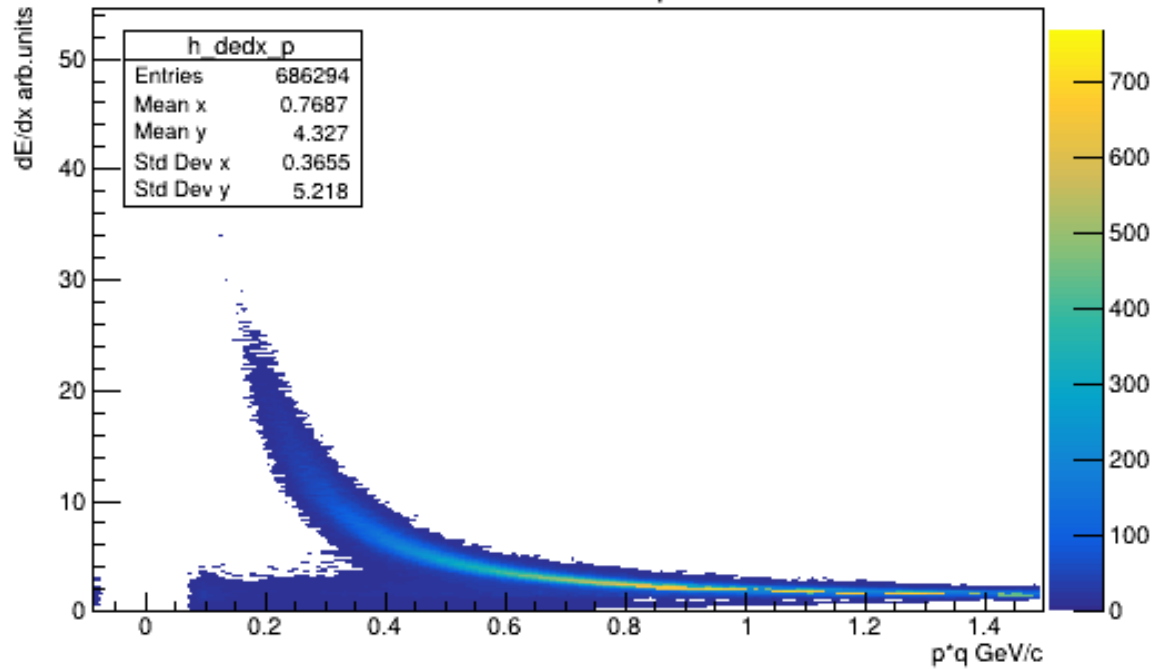
    if (pdg == 1000020030)
    {
        //He3
        h_dedxHe3->Fill(p, dedx);
        h_m2He3->Fill(p, mpdtrack->GetTofMass2());
    }else if (pdg == 1000020040)
    {
        //He4
        h_dedxHe4->Fill(p, dedx);
        h_m2He4->Fill(p, mpdtrack->GetTofMass2());
    }else if (pdg == 1000010030)
    {
        //Tritio(t)
        h_dedxt->Fill(p, dedx);
        h_m2t->Fill(p, mpdtrack->GetTofMass2());
    }else if (pdg == 1000010020)
    {

```

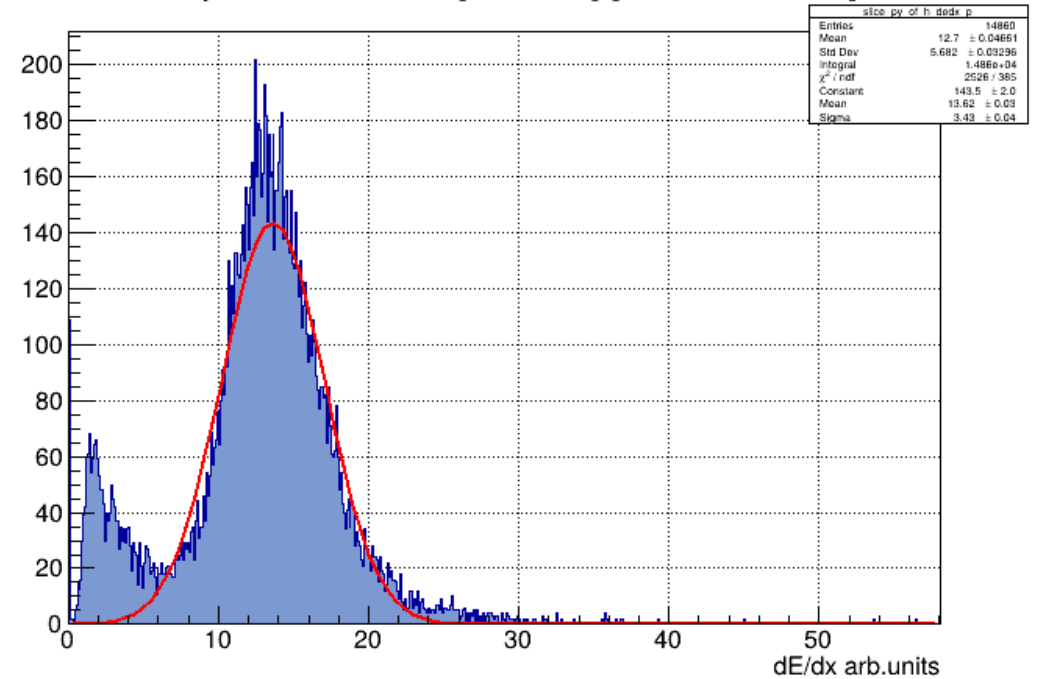
Adjustment function for the distribution of energy loss.



dEdx vs P for the proton



ProjectionY of binx=[174,178] [x=0.230..0.280]



Adjustment function for the distribution of energy loss.



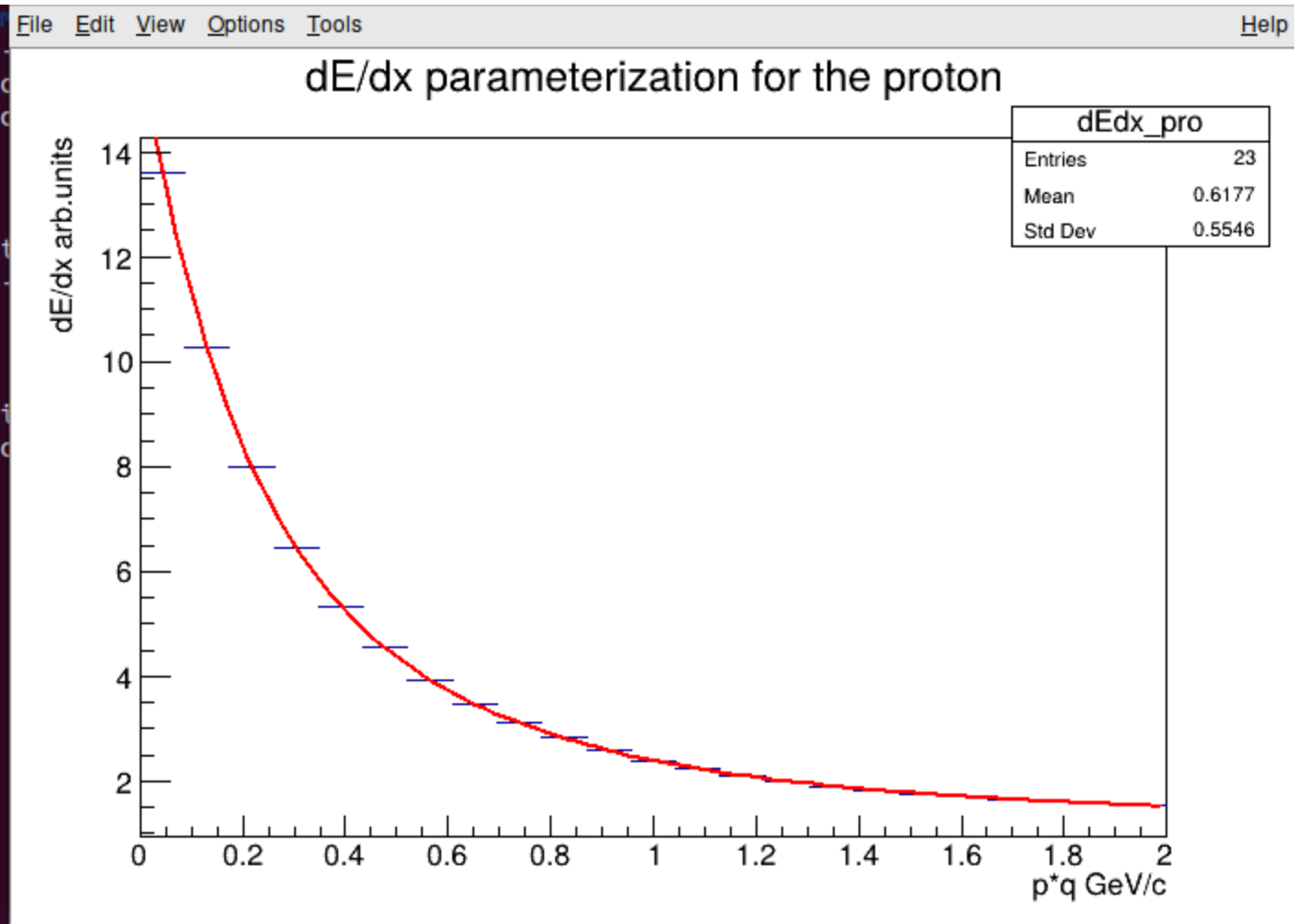
```
void ajus1(){  
  
    TH1F *fa = new TH1F("dEdx_pro", "dE/dx parameterization for the proton; p*q GeV/c; dE/dx arb.units", 23, 0, 2);  
  
    fa->SetBinContent(1,1.36163e+01);  
    fa->SetBinContent(2,1.02847e+01);  
    fa->SetBinContent(3,7.99722e+00);  
    fa->SetBinContent(4,6.45149e+00);  
    fa->SetBinContent(5,5.34184e+00);  
    fa->SetBinContent(6,4.54093e+00);  
    fa->SetBinContent(7,3.93007e+00);  
    fa->SetBinContent(8,3.46964e+00);  
    fa->SetBinContent(9,3.11232e+00);  
    fa->SetBinContent(10,2.82138e+00);  
    fa->SetBinContent(11,2.58719e+00);  
    fa->SetBinContent(12,2.39672e+00);  
    fa->SetBinContent(13,2.24181e+00);  
    fa->SetBinContent(14,2.10775e+00);  
    fa->SetBinContent(15,1.99727e+00);  
    fa->SetBinContent(16,1.90641e+00);  
    fa->SetBinContent(17,1.82777e+00);  
    fa->SetBinContent(18,1.75997e+00);  
    fa->SetBinContent(19,1.70139e+00);  
    fa->SetBinContent(20,1.64734e+00);  
    fa->SetBinContent(21,1.60793e+00);  
    fa->SetBinContent(22,1.56828e+00);  
    fa->SetBinContent(23,1.53603e+00);  
}
```

Adjustment function for the distribution of energy loss.



```
alejandro@toolbox:~/Documentos/Codigos MPDroot/EnerClass1/si
-----
| Welcome to ROOT 6.32.02                               https://ro
| (c) 1995-2024, The ROOT Team; conception: R. Brun, F. Rad
| Built for linuxx8664gcc on Jun 19 2024, 14:41:37
| From heads/master@tags/v6-32-02
| With c++ (GCC) 13.2.0
| Try '.help'/'?', '.demo', '.license', '.credits', '.quit
-----

root [0]
Processing ajus1.C...
Info in <TCanvas::MakeDefCanvas>: created default TCanvas wi
root [1] TFitEditor::DoFit - using function PrevFitTMP 0x25c
*****
Minimizer is Linear / Migrad
Chi2          =      11.3892
Ndf           =          13
p0            =      15.8852 +/- 0.0595794
p1            =     -57.5888 +/- 1.033
p2            =     137.131 +/- 6.77278
p3            =     -228.23 +/- 22.5093
p4            =     270.298 +/- 43.1134
p5            =    -225.445 +/- 50.4726
p6            =     128.652 +/- 36.6953
p7            =     -47.552 +/- 16.1642
p8            =     10.2096 +/- 3.94943
p9            =     -0.963231 +/- 0.410632
```



Thanks for your attention

