Progress Report

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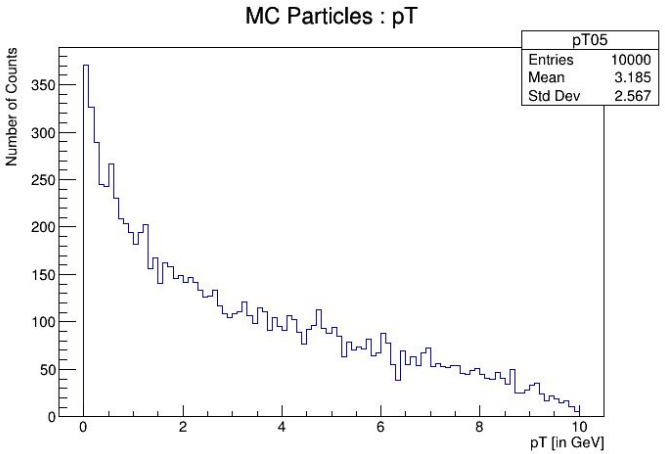
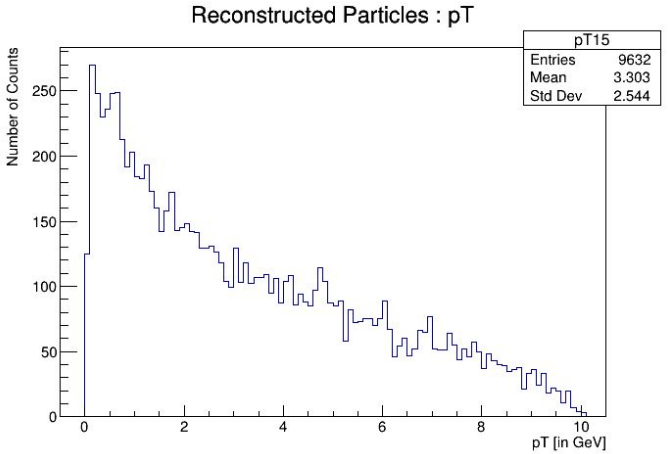
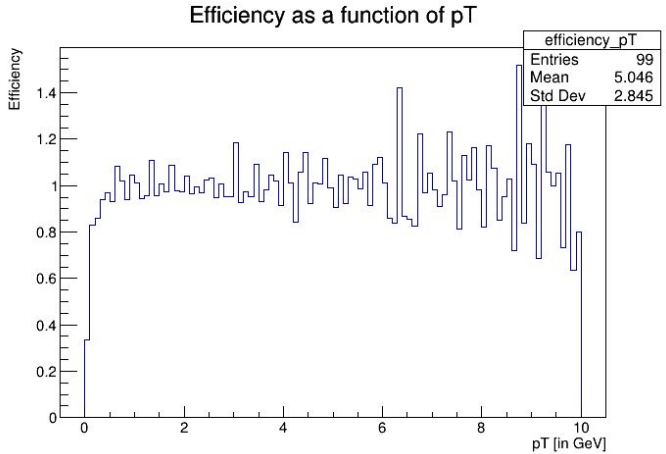
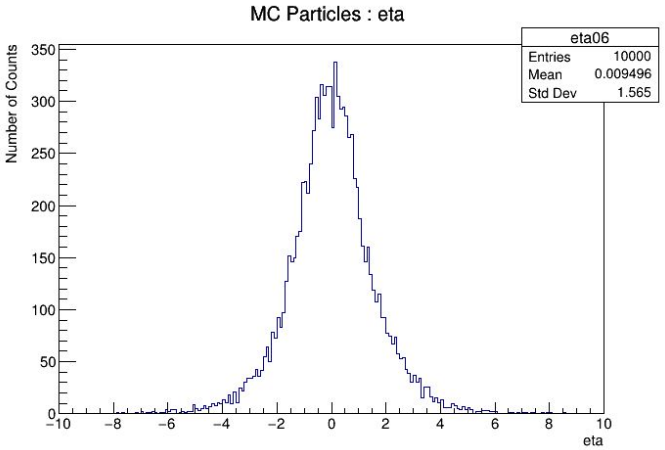
Efficiency Plot: pT

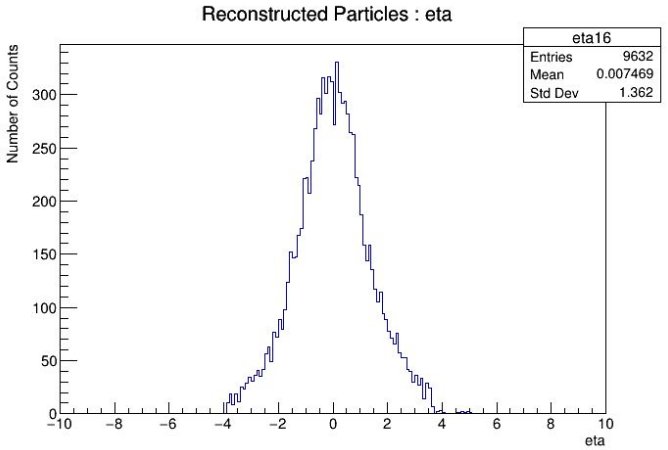


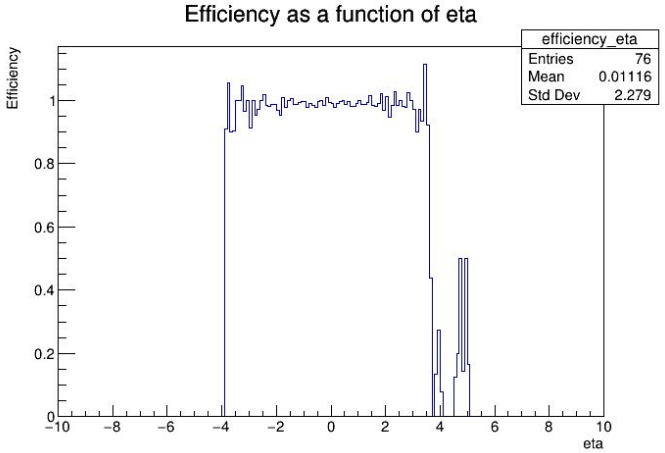




Efficiency Plot: Eta

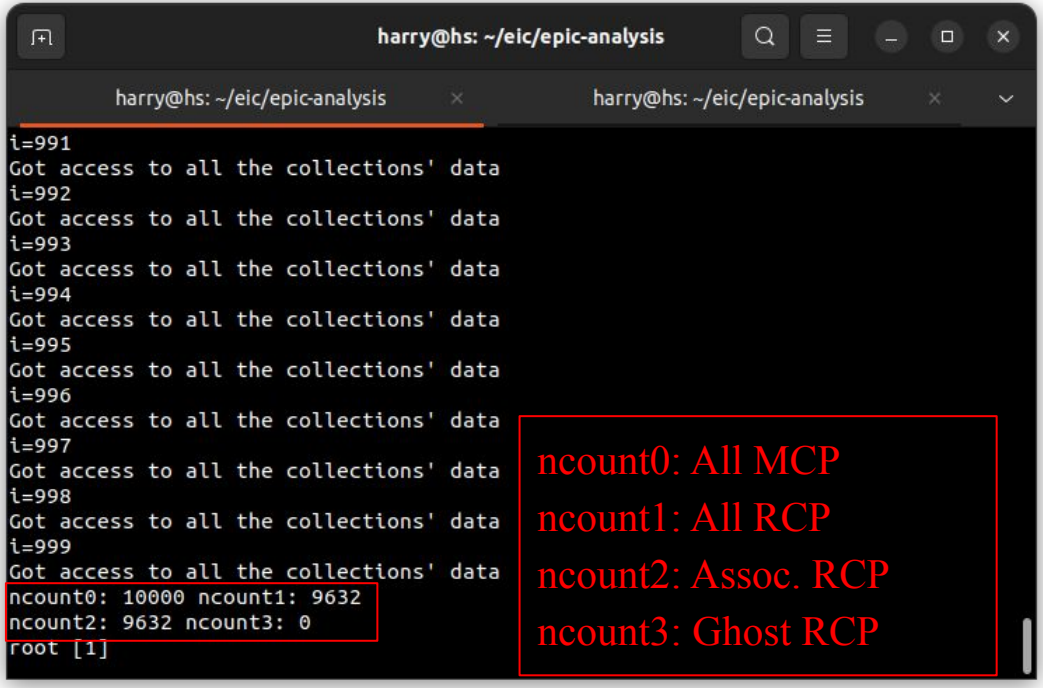






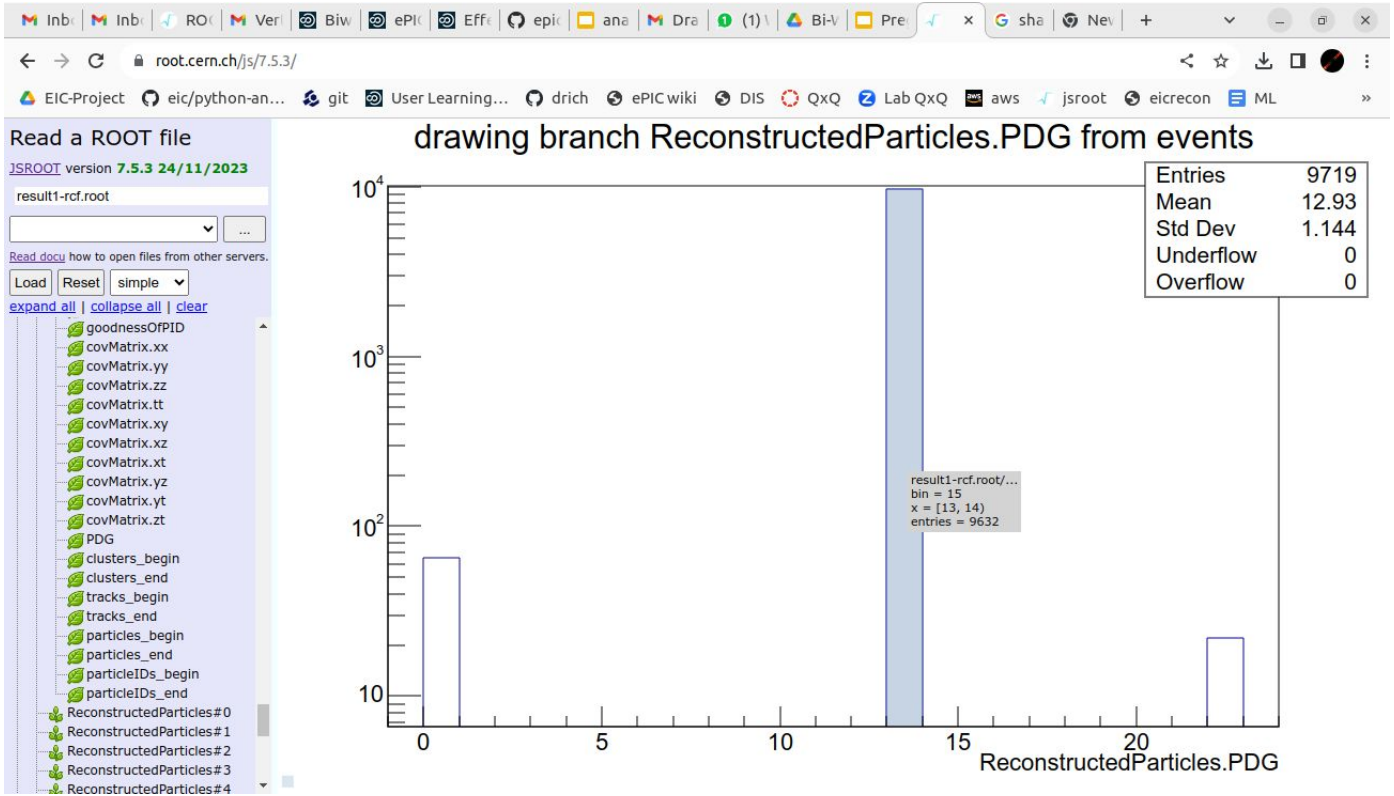
Ghost Rate

I am not getting any ghost particles i.e. Muons that ARE reconstructed but NOT having an association to any MC particle.



Ghost Rate

Total 9632 muons are reconstructed and all the associated to a MC particle.



Ghost Rate

Conditions/Cut used to select particles from associations:

```
// loop over association to find reconstructed particles having a corrsponding MC particles using "bool found"
for (const auto &assoc : mcRecAssocs)
{
  auto recPart = assoc.getRec(); // reconstructed particle
  auto simPart = assoc.getSim(); // simulated (truth) particle

  if (simPart.getGeneratorStatus() != 1 || recPart.getPDG() != 13 || simPart.id() != mp.id() )
  {
    continue;
  }

  found_RC_corres_MC = true;

  //vector_mc_asso.SetPxPyPzE(simPart.getMomentum().x, simPart.getMomentum().y, simPart.getMomentum().z, simPart.getEnergy());
  vector_rp_asso.SetPxPyPzE(recPart.getMomentum().x, recPart.getMomentum().y, recPart.getMomentum().z, recPart.getEnergy());
  break;
}

if(found_RC_corres_MC) //these are only those reconstructed particles which have a corresponding associated MC particle
{
  ncount2+=1;
  hist[2][0]->Fill(vector_rp_asso.E());
  hist[2][1]->Fill(vector_rp_asso.P());
  hist[2][2]->Fill(vector_rp_asso.Px());
  hist[2][3]->Fill(vector_rp_asso.Py());
  hist[2][4]->Fill(vector_rp_asso.Pz());
```

About reconstructed track positions

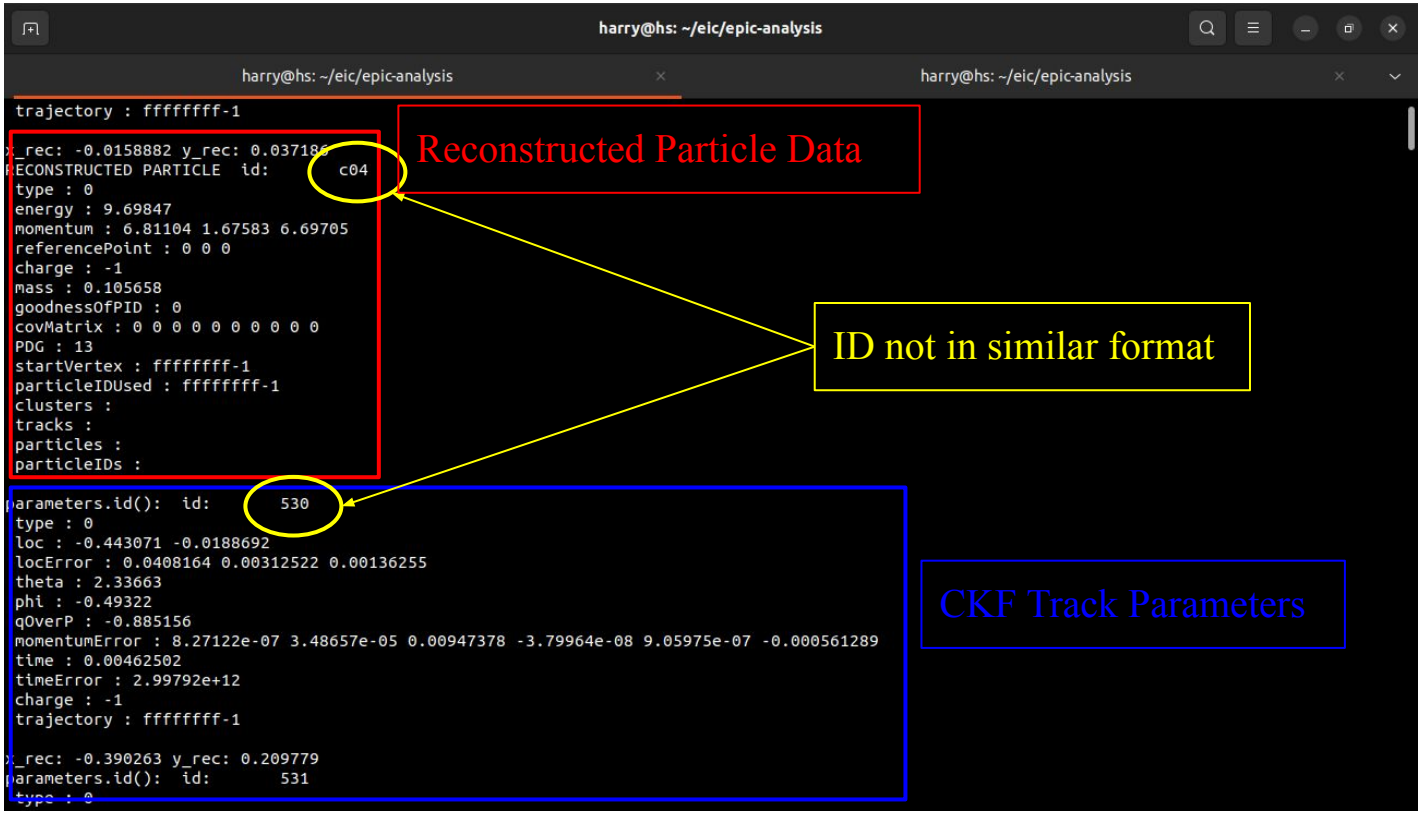
I am able to access the position coordinates as:

```
for (const auto parameters : truth_seeded_tracking)
  {
    auto r_rec = parameters.getLoc().a;
    auto x_rec = r_rec*cos(parameters.getPhi());
    auto y_rec = r_rec*sin(parameters.getPhi());
    auto z_rec = parameters.getLoc().b;

    //std::cout<< "parameters.id(): " << parameters.id() << std::endl;
    //std::cout<< "x_rec: " << x_rec << " y_rec: " << y_rec << std::endl;
    //TVector3 reconstructed_position(x_rec, y_rec, z_rec);
    //float pos_mag = reconstructed_position.Mag();
  }
```

About reconstructed track positions

But not able to match them using the .id() function as done with associations because:



Some Questions:

- What is truth seeded and real seeded track reconstruction?
- Any idea on how to associate track parameters with the reconstructed particles?

Further Plans:

- To locate truth(MC) track positions in order to plot track position resolutions
- To use something other than muons in simulations like pions so that I may observe some ghost particles as well and check that there is no issue with the code atleast.

Please provide suggestions on what to do next?

Thank you!