

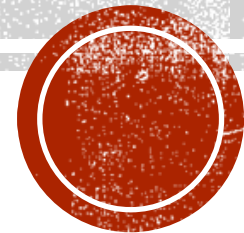
Particle production studies for pfRICH

Jan Vanek

BNL

pfRICH meeting

01/04/2023

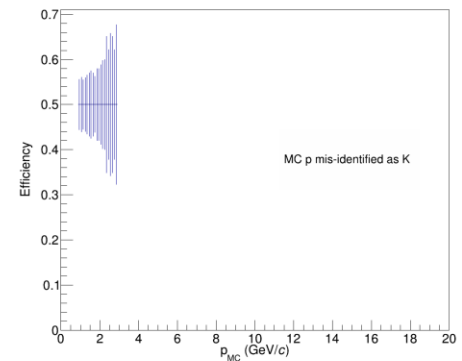
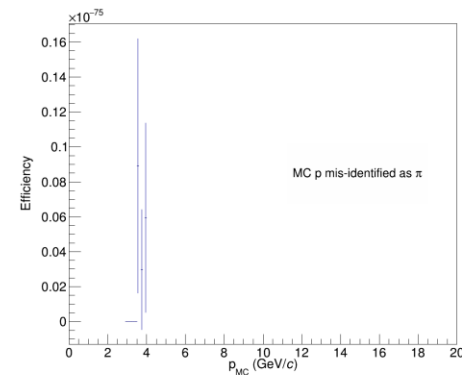
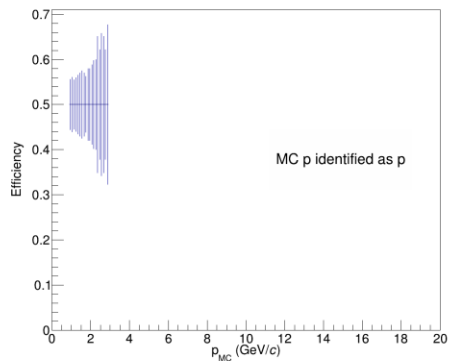
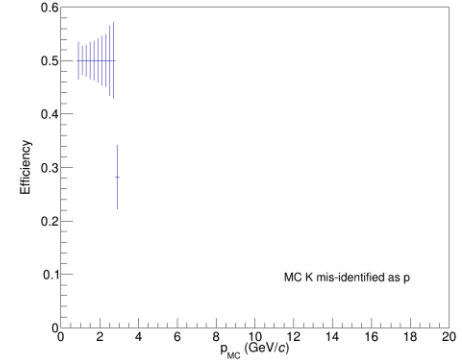
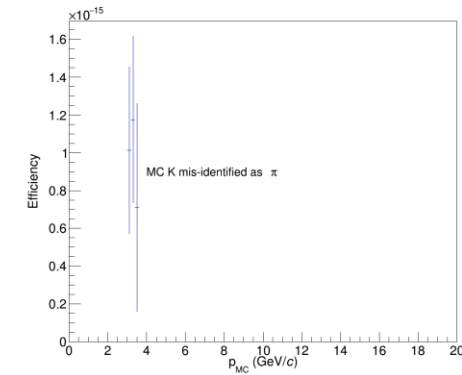
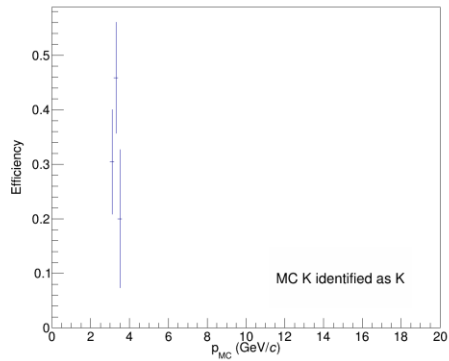
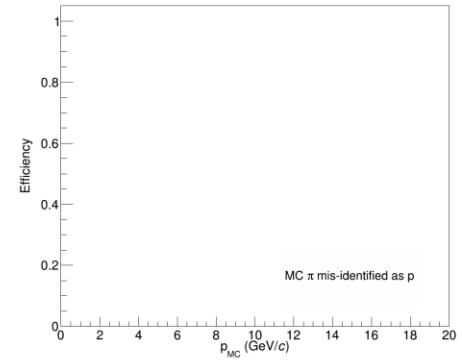
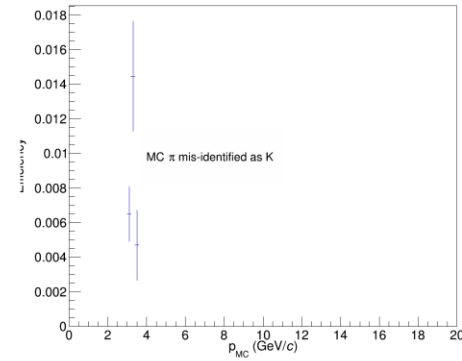
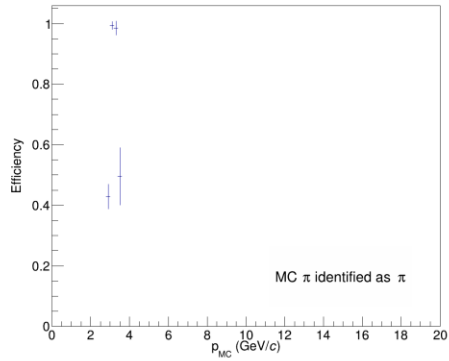


OVERVIEW

- PID probabilities/efficiencies extracted from pfRICH PID tables
 - MC DIS ep collisions 5x41, 10x100, and 18x275 GeV
 - MC level, RC level and difference between them

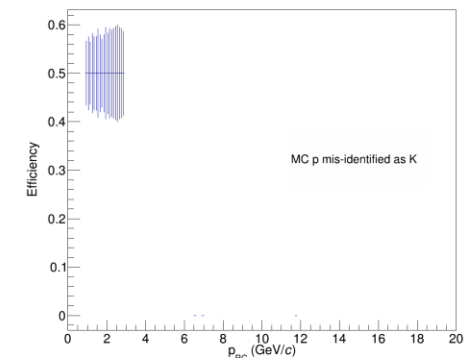
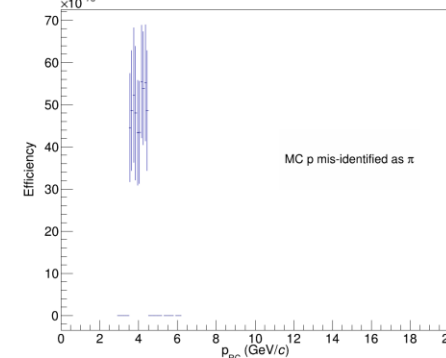
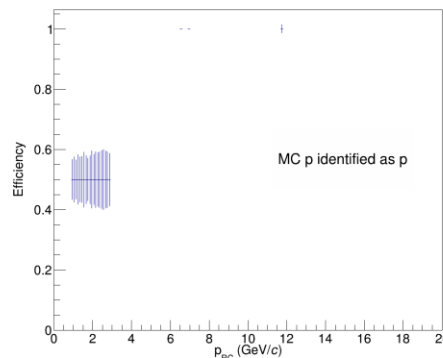
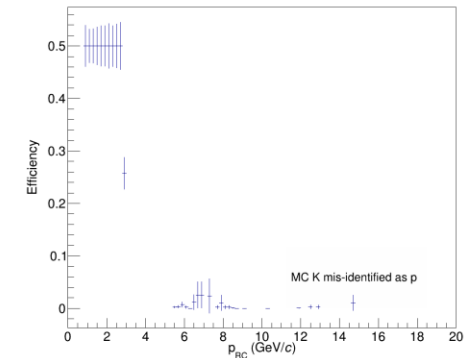
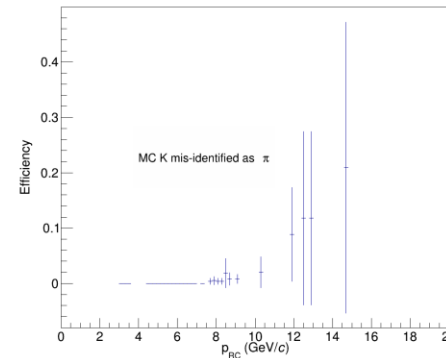
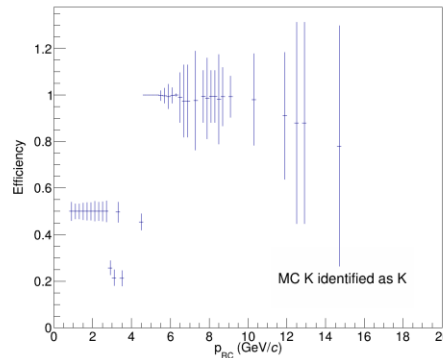
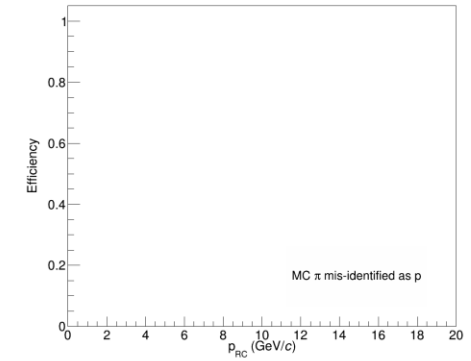
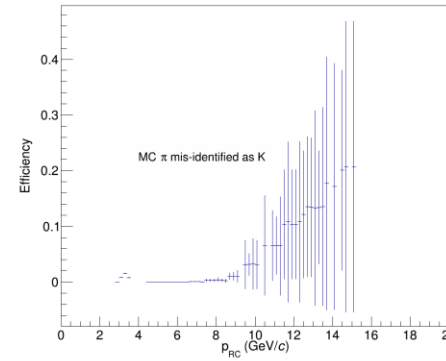
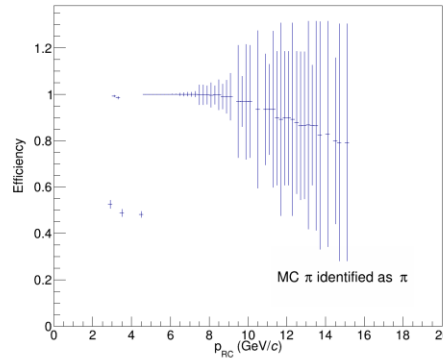
PID PROBABILITY IN 4x51 GeV VS. MC p

- PID probability extracted from pFRICH PID tables
 - MC DIS ep collisions 5x41 GeV
 - MC momentum
- Very low number of MC hadrons?



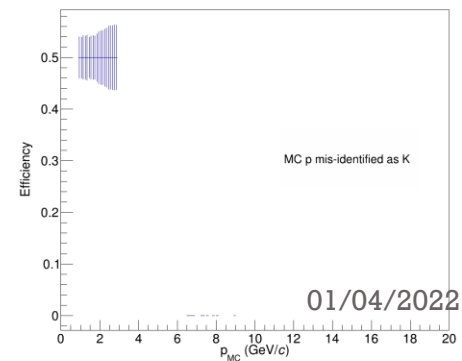
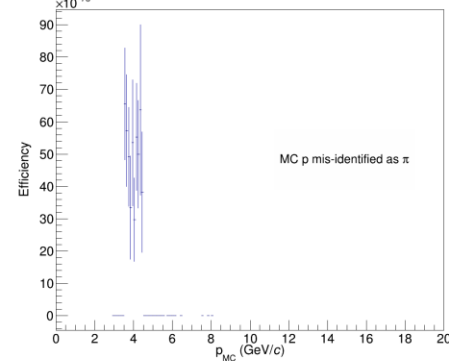
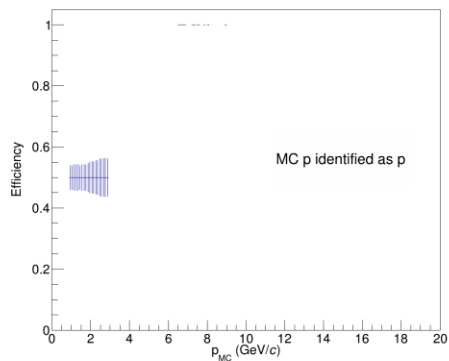
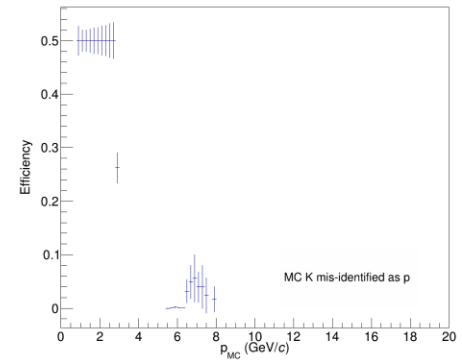
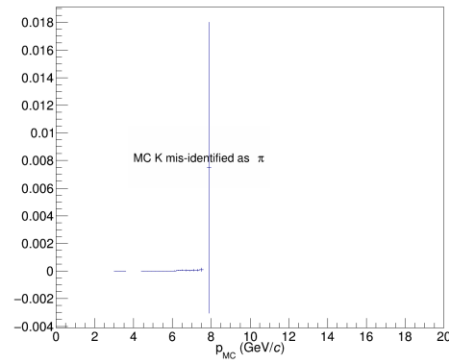
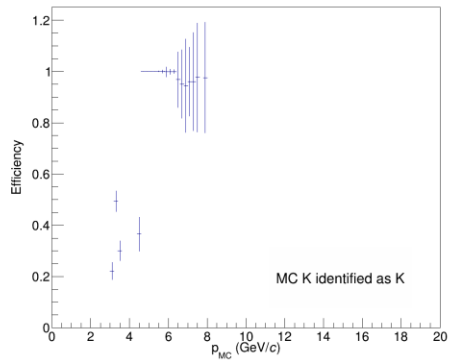
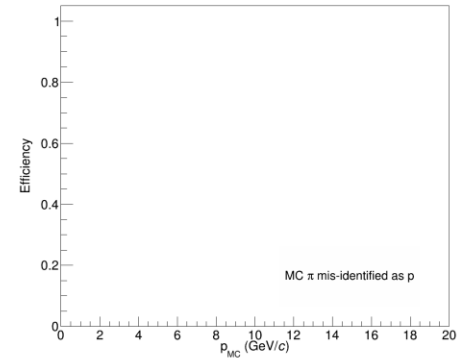
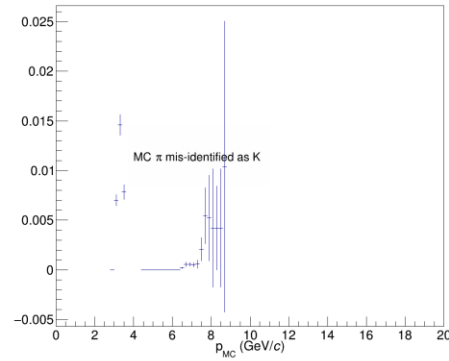
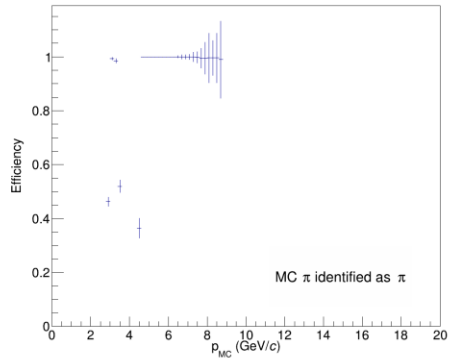
PID PROBABILITY IN 4x51 GeV VS. RC p

- PID probability extracted from pfRICH PID tables
 - MC DIS ep collisions 5x41 GeV
 - RC momentum
- Multiplicity more reasonable, but observed also hadrons with rather large p
 - Filled tracks are within pfRICH geometrical acceptance
 - Large statistical errors indicate that multiplicity of the high p tracks is low
 - Indication of issues with reconstruction, similar as observed in long tail of E/p in eCAL?



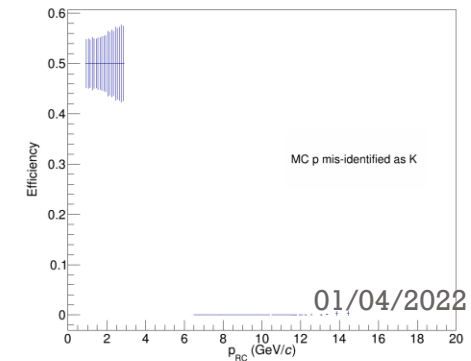
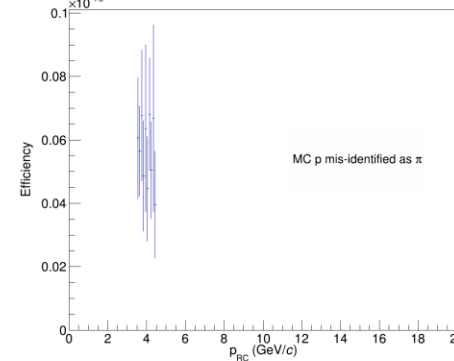
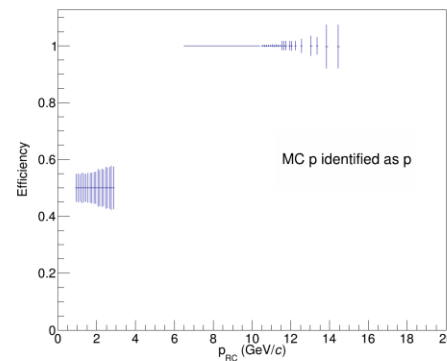
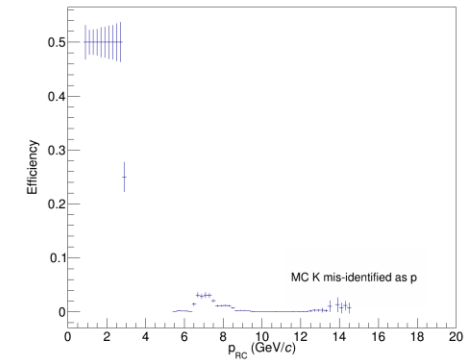
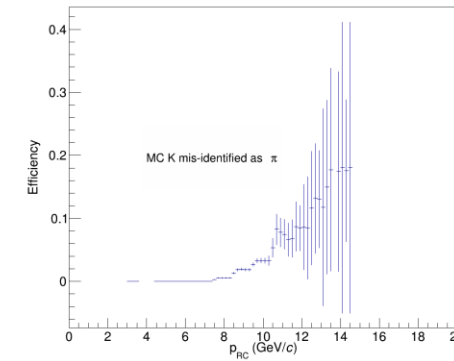
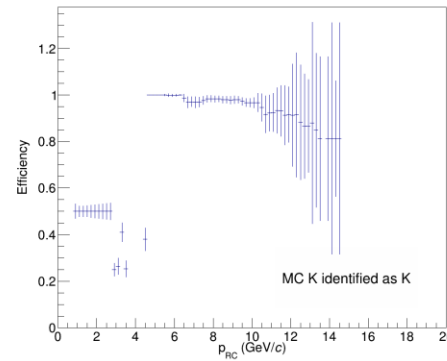
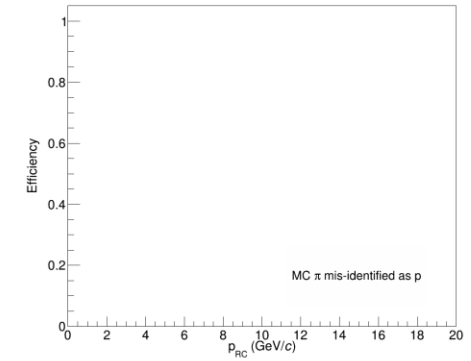
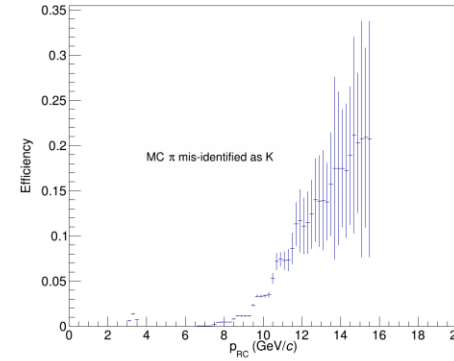
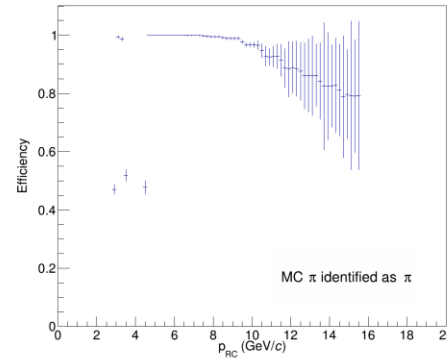
PID PROBABILITY IN 10x100 GeV VS. MC p

- PID probability extracted from pFRICH PID tables
 - MC DIS ep collisions 10x100 GeV
 - MC momentum
- Reasonable number of hadrons?
 - Limit seems to be energy of the electron, i.e. 10 GeV



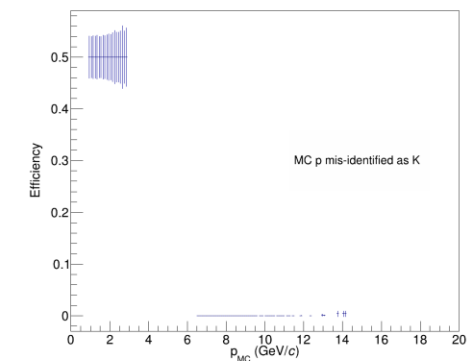
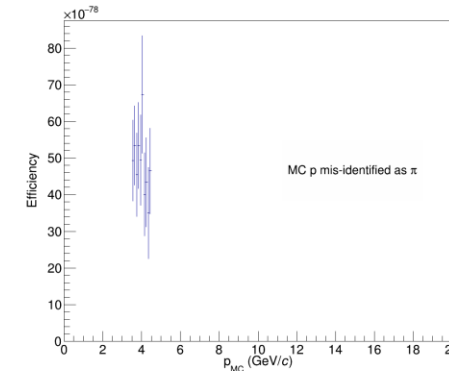
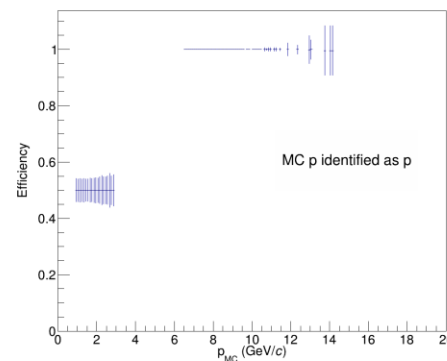
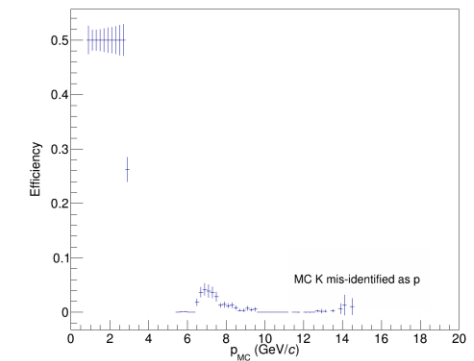
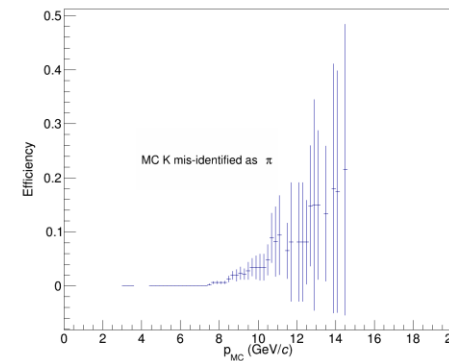
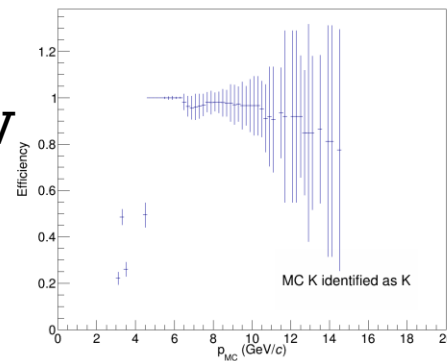
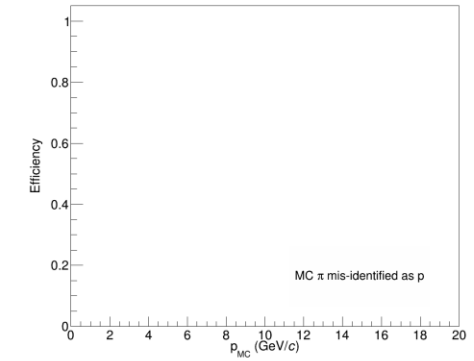
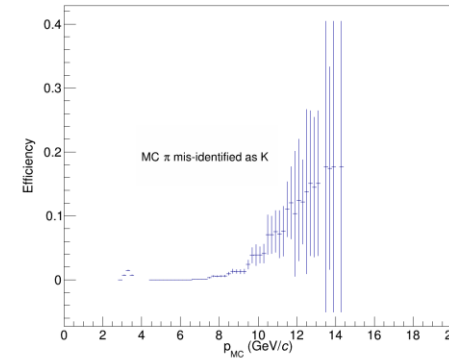
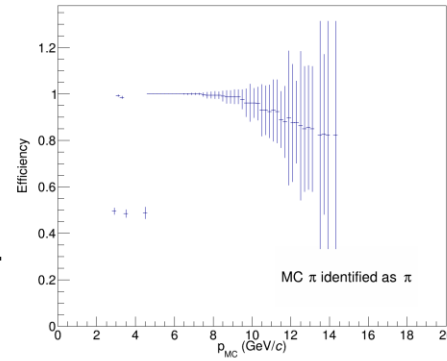
PID PROBABILITY IN 10x100 GeV VS. RC p

- PID probability extracted from pFRICH PID tables
 - MC DIS ep collisions 10x100 GeV
 - RC momentum
- Multiplicity more reasonable, but observed also hadrons with rather large p
 - As for 5x41 GeV, quite large momenta observed
 - 10x100 GeV distributions on RC level similar p coverage as 4x51 GeV



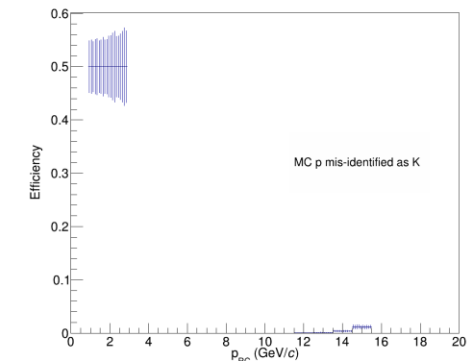
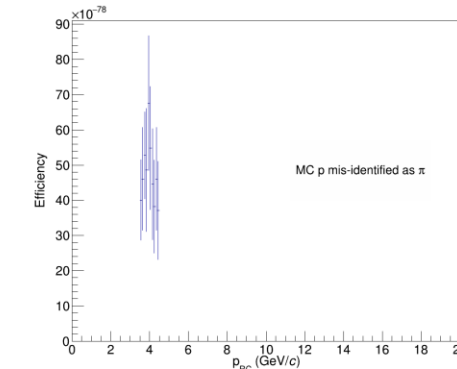
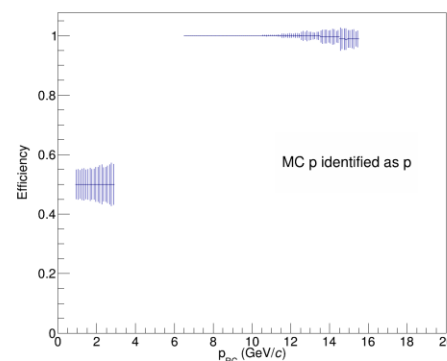
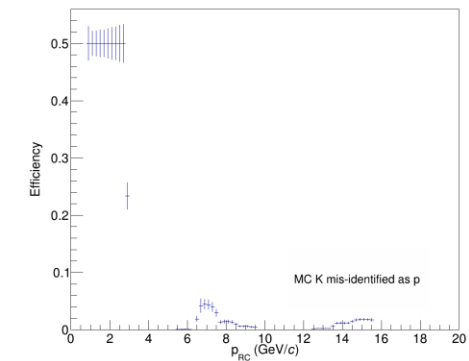
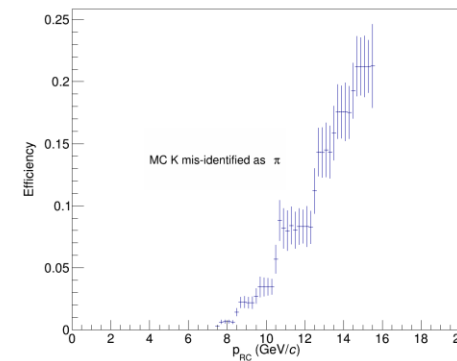
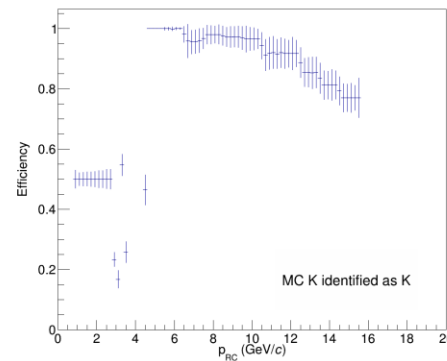
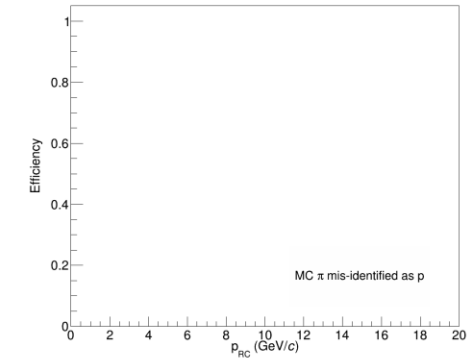
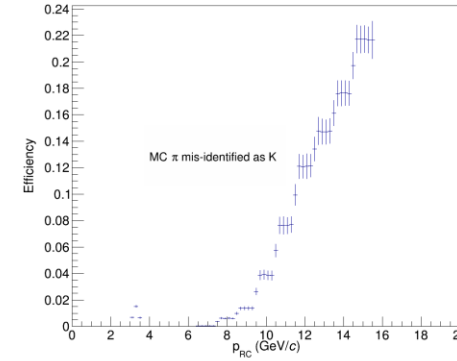
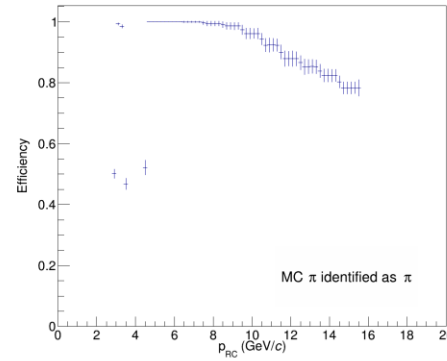
PID PROBABILITY IN 18x275 GeV VS. MC p

- PID probability extracted from pFRICH PID tables
 - MC DIS ep collisions 27x275 GeV
 - MC momentum
- Reasonable number of hadrons?
 - Limit seems to be close to the energy of the electron, i.e. 18 GeV



PID PROBABILITY IN 18x275 GeV VS. RC p

- PID probability extracted from pFRICH PID tables
 - MC DIS ep collisions 27x275 GeV
 - RC momentum
- The only energy where p coverage looks consistent between MC and RC
 - Still large difference in track multiplicity



SUMMARY

- Observed mis-match between p range in simulation for MC and RC tracks
 - Now MC and RC independent
 - Looping over two separate branches, without any matching
 - Want to add RC to MC matching
 - Take RC track and look at its matching MC momentum

- To-do/in progress
 - Add new electron/pion separation to analysis
 - Recently produced input
 - Writing the physics performance chapter of the proposal
 - Have outline and part of first iteration of text ready
 - Need to incorporate the new e/pi separation
 - What all include into the proposal?

THANK YOU FOR ATTENTION