TMS Energy Resolution

Jeffrey Kleykamp

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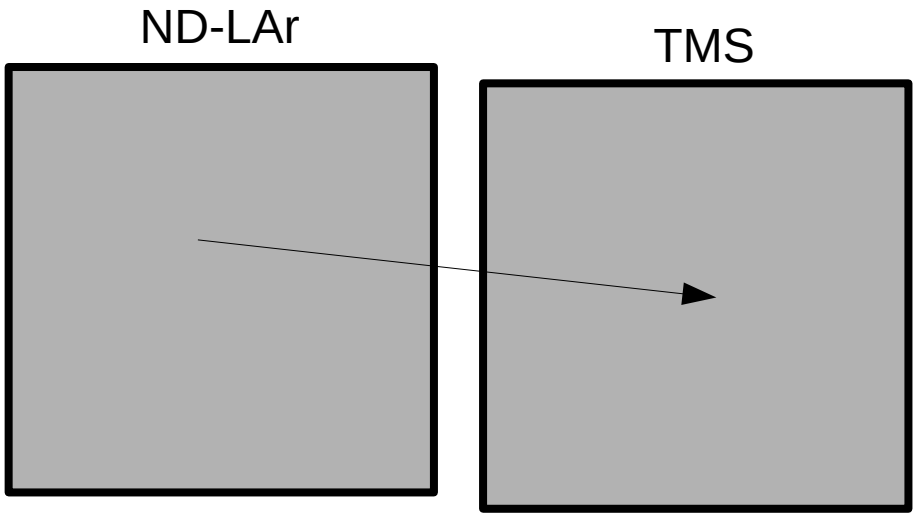
THE UNIVERSITY of MISSISSIPPI

Introduction

- MicroProdN3p1 files on kleykamp_validation branch
  - See datasets wiki page
- Contained selection: true TMS-contained muons
  - More stats
- Reco selection: true TMS-contained muons w/ LAr-start
  - Also pass TMS-reco selection cuts so the reco endpoint isn't near the edges, and start passes through first TMS plane

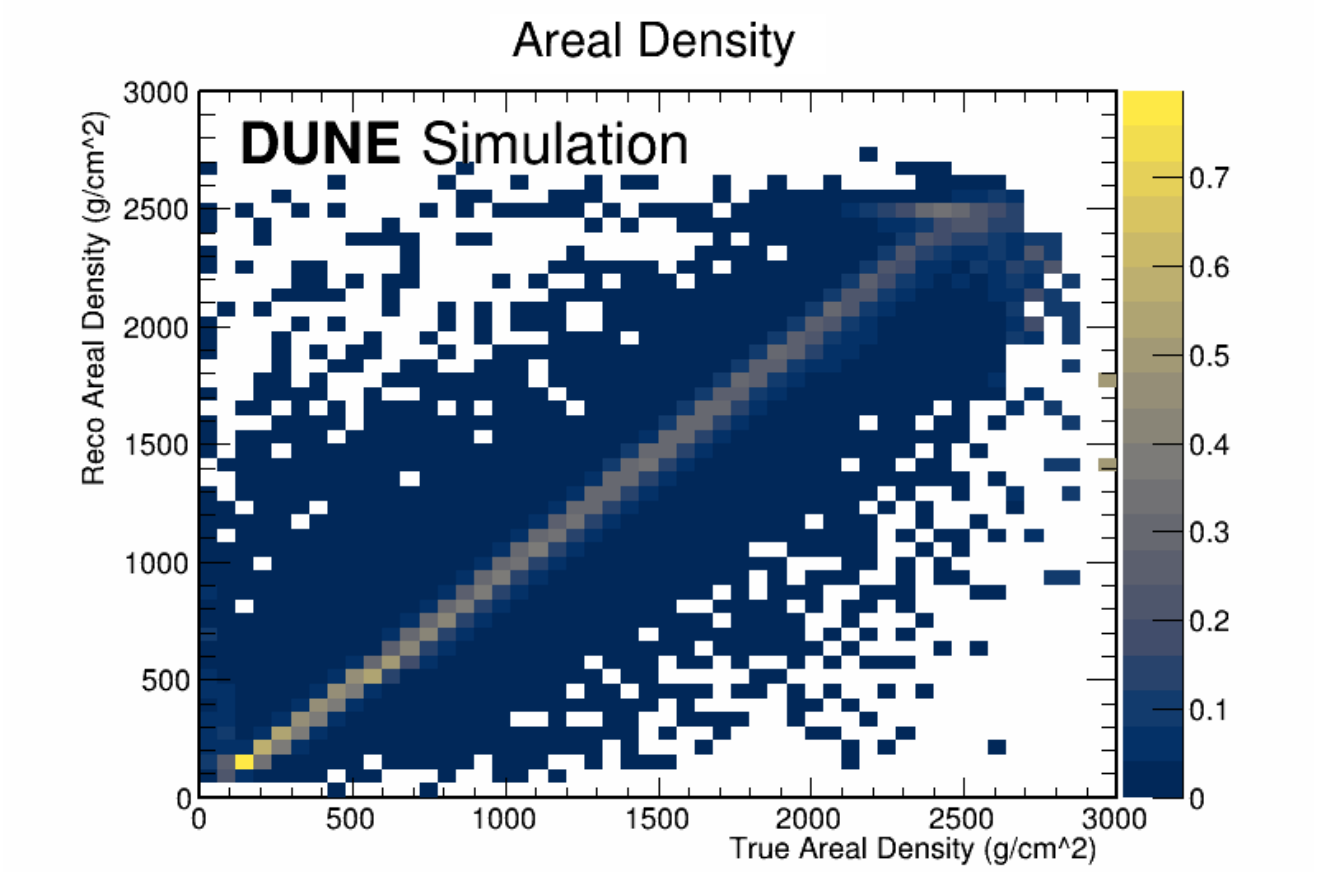
How is Muon KE Calculated

- Muons lose approximately constant energy per unit of density
- So we can approximate muon KE as
  KE_{reco} = const * areal density



- Clarence did a fit of ~2-5 GeV muons and found
  KE_{reco} = 82 MeV +1.75 * areal density MeV / (g/cm^2)
  - We never found out why we needed the constant offset
- $KE_{reco\text{-}full}$ = $KE_{reco\text{-}ND\text{-}LAr}$ + dead material correction + $KE_{reco\text{-}TMS}$

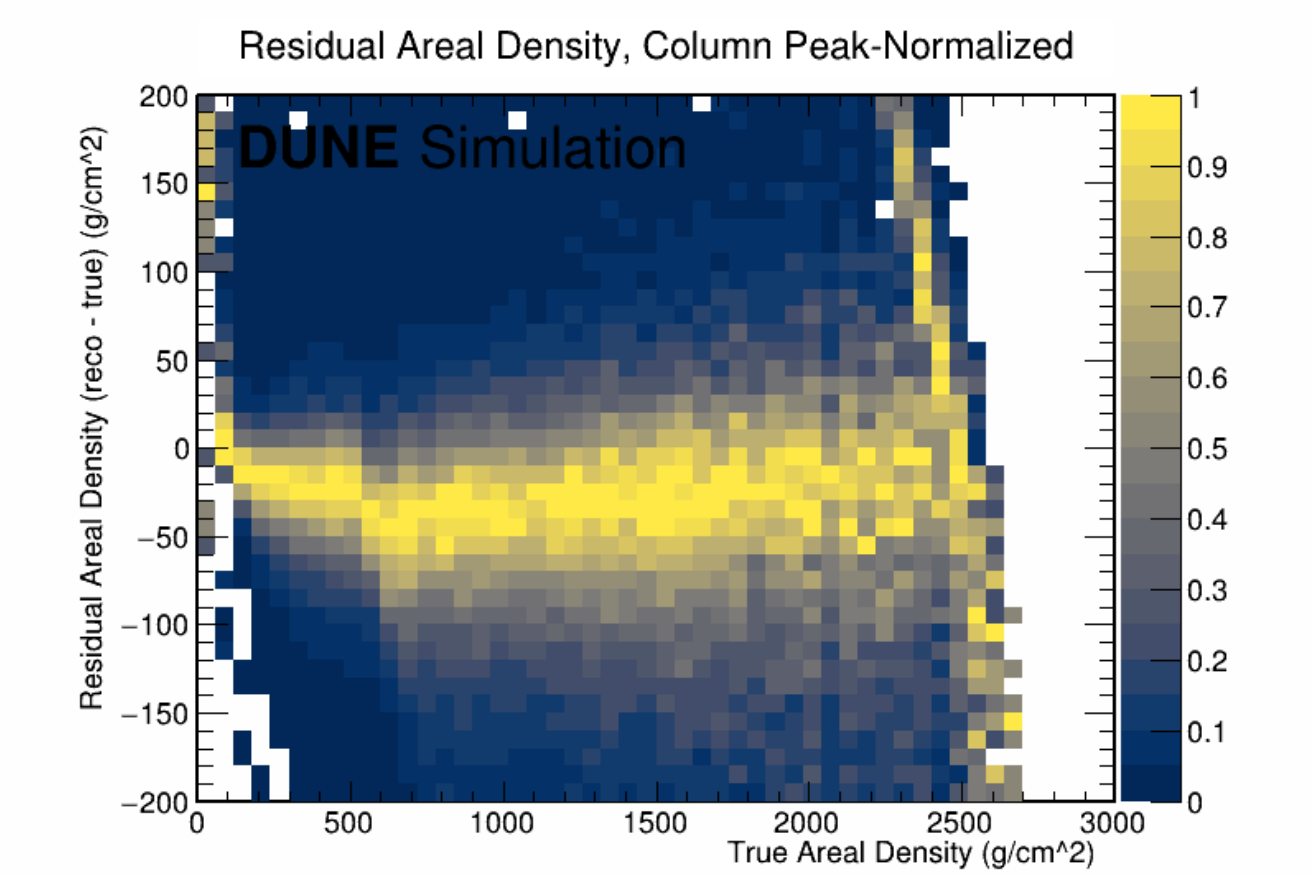
Areal Density



This is “contained” selection. ie all contained muons

Investigating whether there is a little bit of an issue with muons too close to end

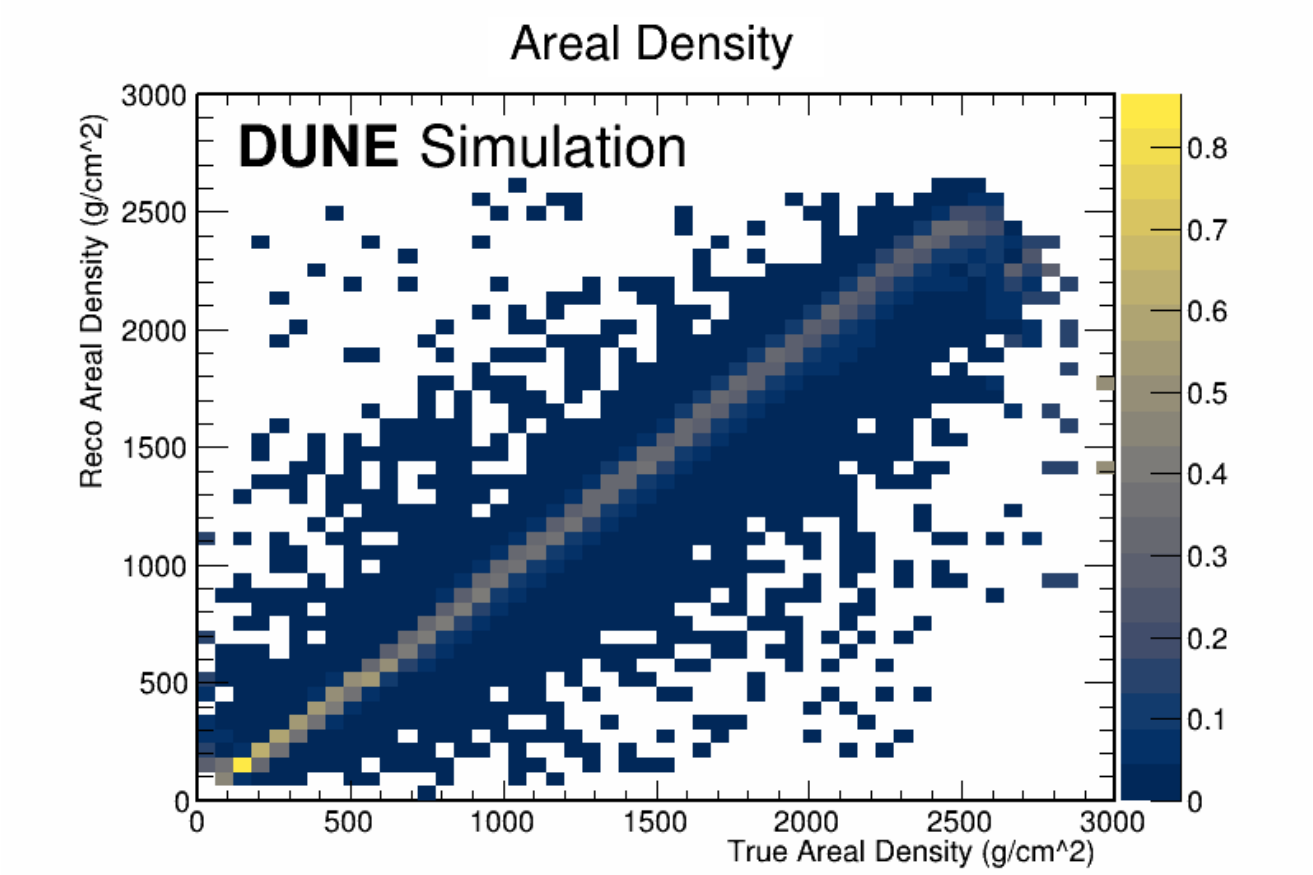
Areal Density, Residual Plots



This is “contained” selection. ie all contained muons

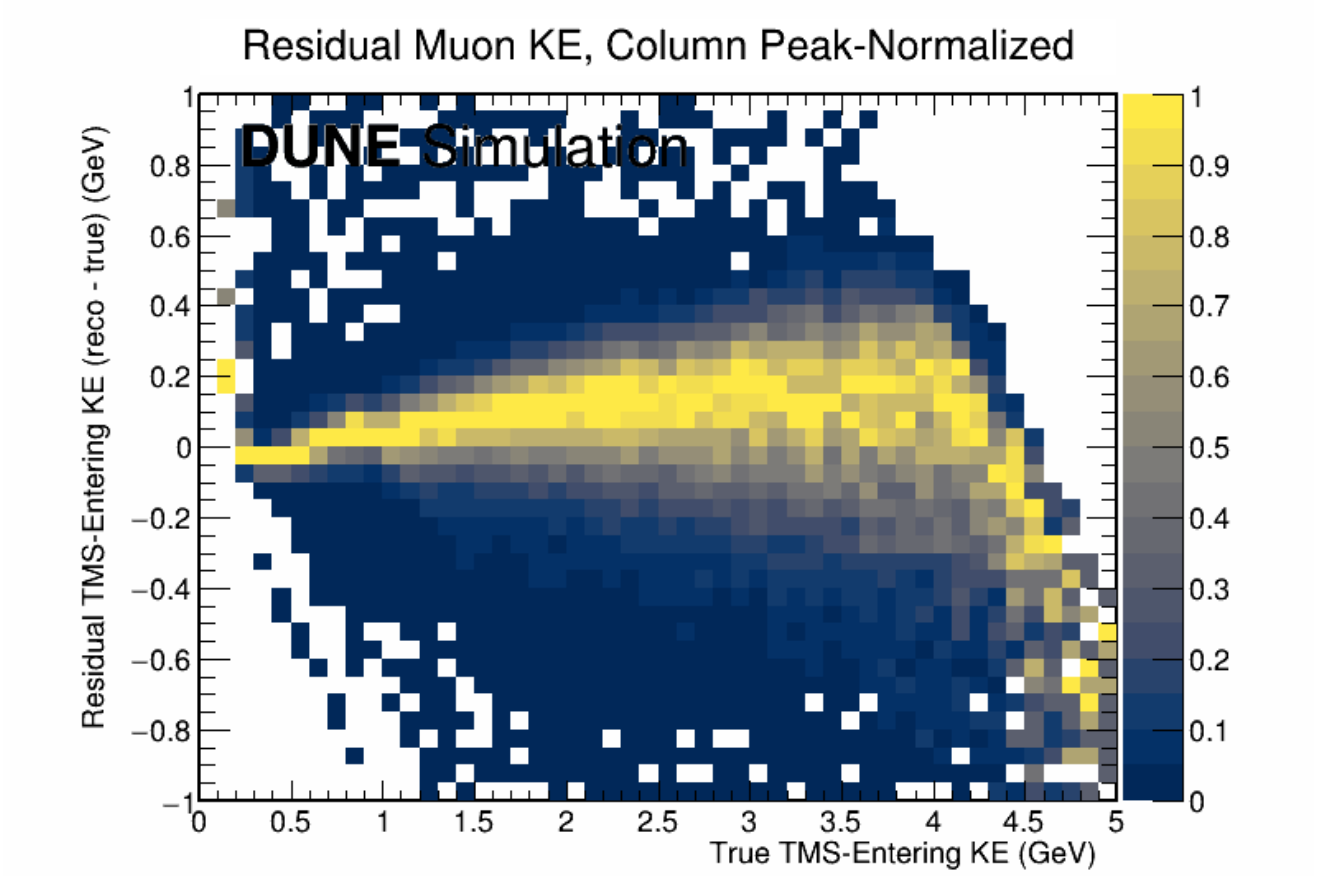
This way is much easier to see that reco is pretty close but ends up a bit below

Areal Density, Column Normalized



This is “reco” selection.
Fewer off-diagonal

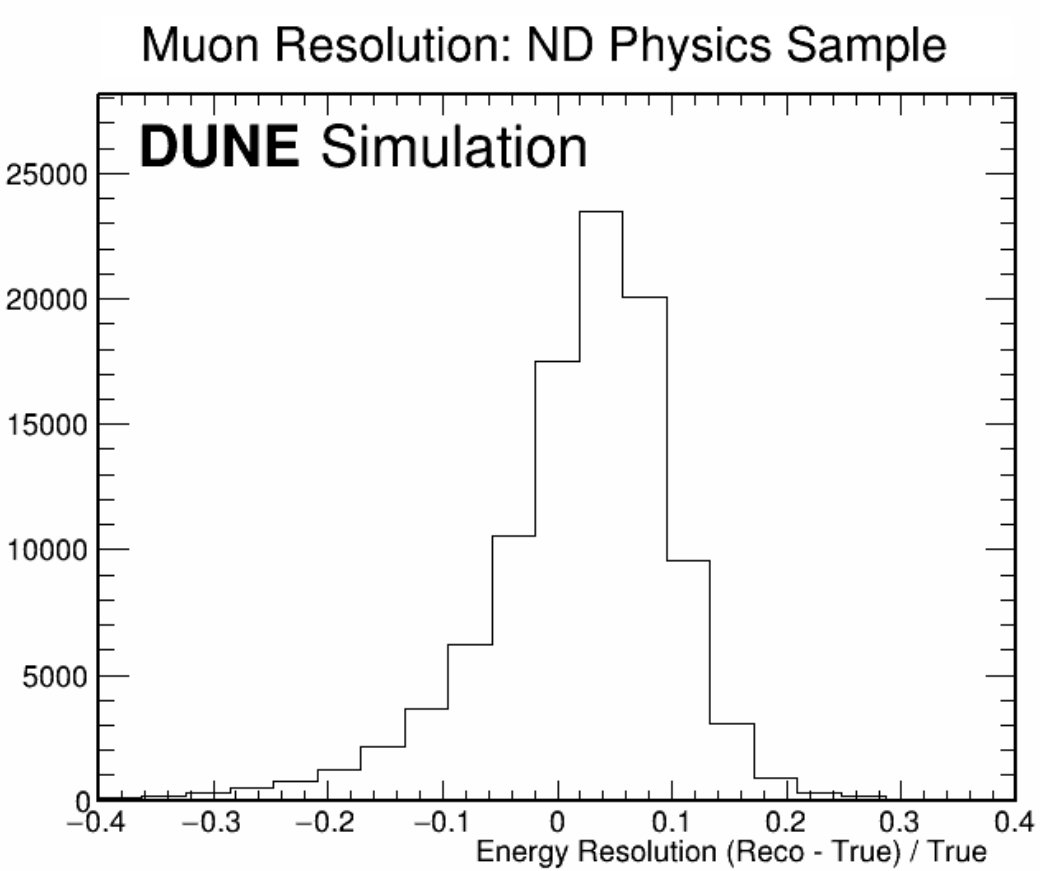
Residual Energy using Old Formula



This is “reco” selection.

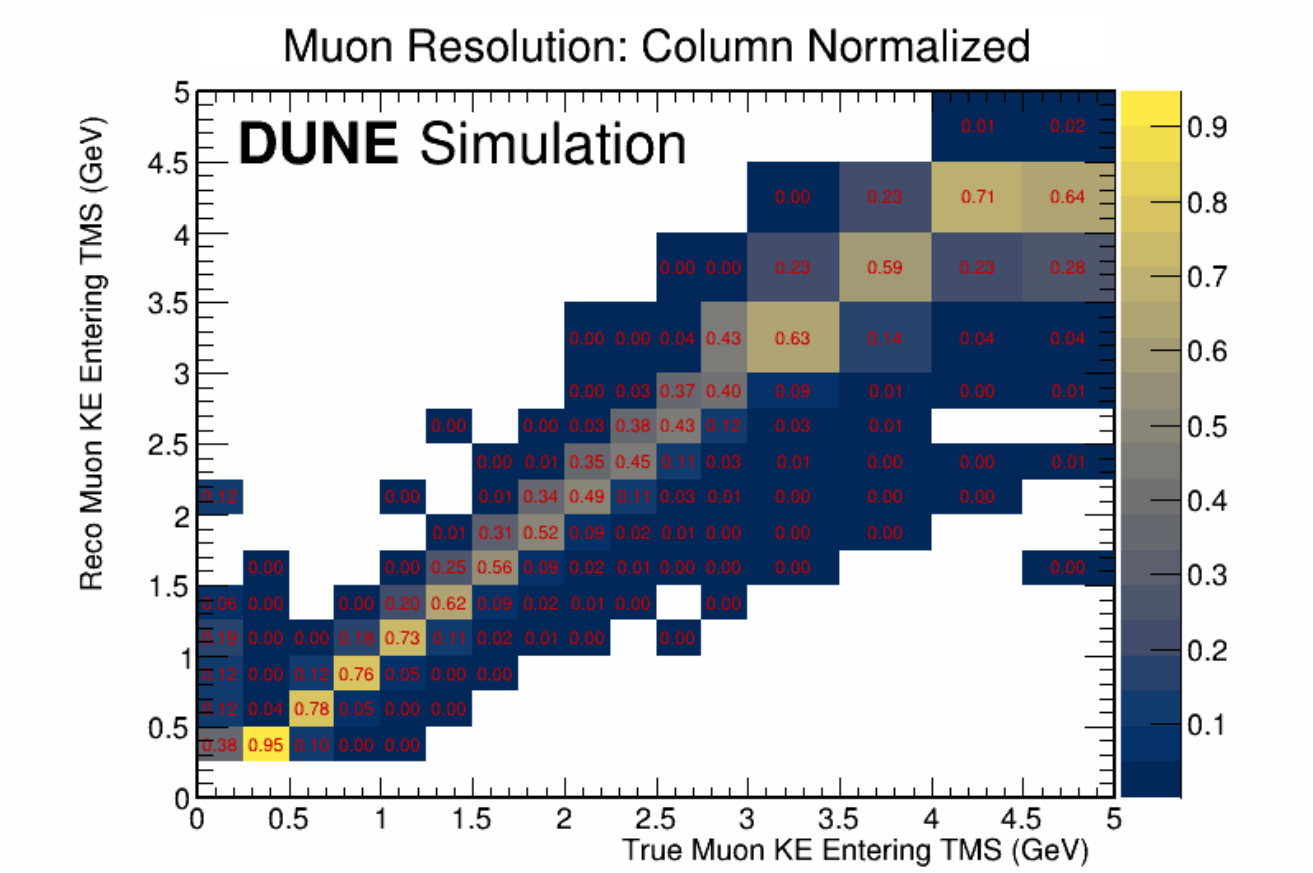
Need to resurrect fitting code. New reco needs smaller correction

Muon Resolution



This is “reco” selection

Muon Resolution



This is “reco” selection. ie all contained muons

Conclusion

- Energy corrections change slightly
- Any particular things you'd like to see?
- What is the best plot to show final energy resolution?
  - 2d column/row normalized, or 1d fraction energy resolution