Investigating Hadronic Energy Reconstruction Change in Paired Data: First attempt at splitting hits

Colin Weber

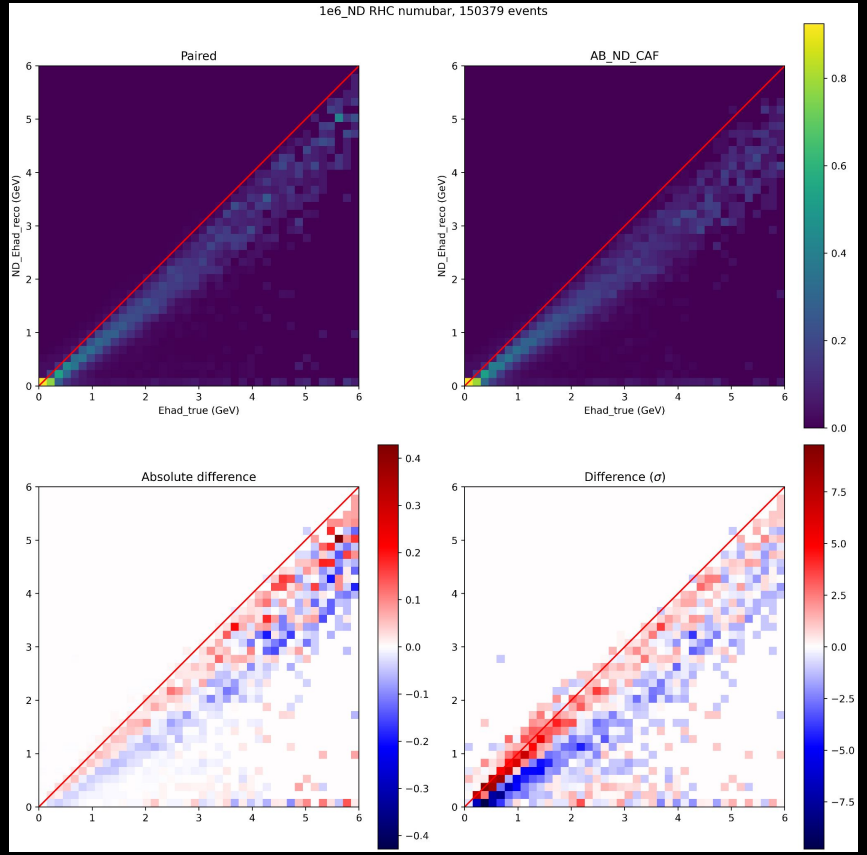
Possible problem 3: ND parametrized reco different than in caf?

- Negligible differences in leptonic reconstruction
- Improvement is in ~~hadronic reconstruction~~ *all* hadrons

- Protons
- Neutrons
- Pi+ (lower RHC stats)
- Pi-
- Pio

Differences found in the way hits are split across boundaries

Need to split hits in LAr world



Implementation

- In LAr world sim, input ND hall geometry but change all materials to LAr AND activate all volumes
- Done via “GDML surgery”. Wrote a function that (I think*) takes a GDML file, changes all materialref values to LAr, and adds “SensDet” as the auxtype (w/ auxvalue same as that in LAr world) to all volumes where appropriate

There are 4 possible locations that the auxtype line could go, so have to account for way fewer options than the “Copy and Paste” method

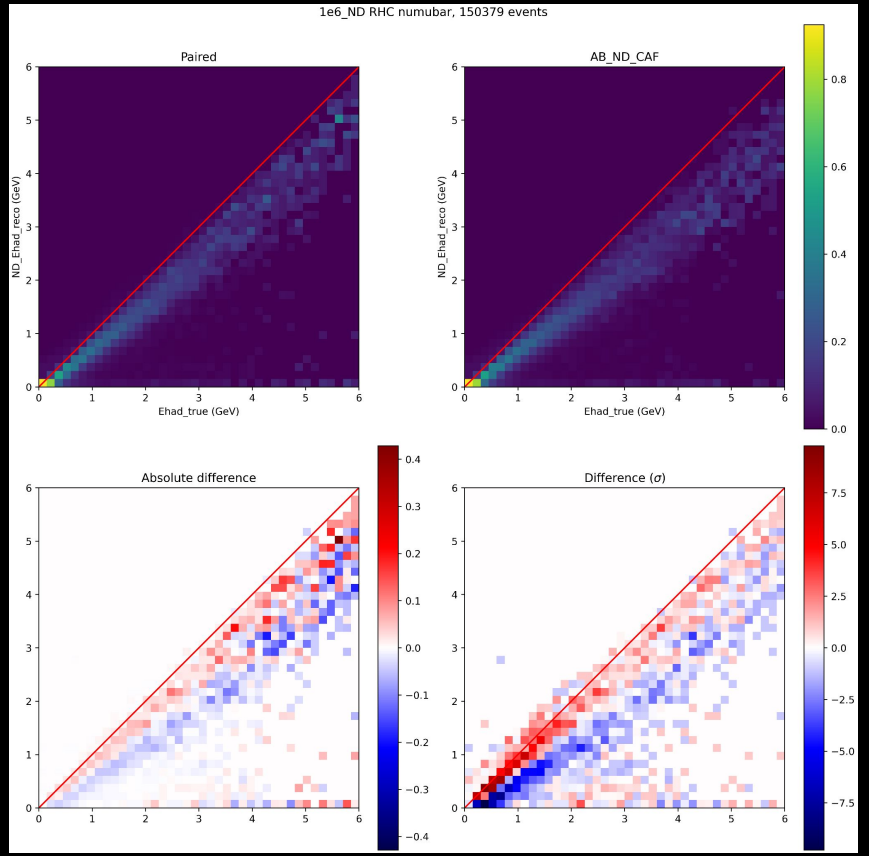
* As I will show, this doesn’t work yet

```
<volume name="volLightUsPlane">
  <materialref ref="PVT"/>
  <solidref ref="LightUsPlane"/>
</volume>
<volume name="volLArActive">
  <materialref ref="LAr"/>
  <solidref ref="LArActive"/>
  <auxiliary auxtype="SensDet" auxvalue="ArgonCube"/>
</volume>
<volume name="volLightDsPlane">
  <materialref ref="PVT"/>
  <solidref ref="LightDsPlane"/>
</volume>
```

~10k generated in FHC and RHC (we see problem in both cases)

ND PRISM cuts applied

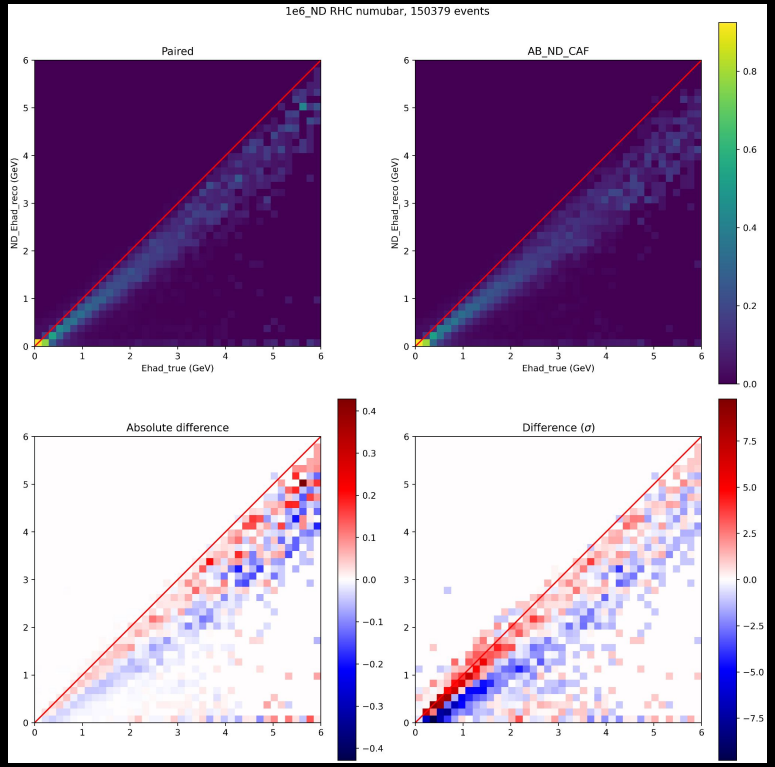
Showing old 2D plots vs. new 2D plots

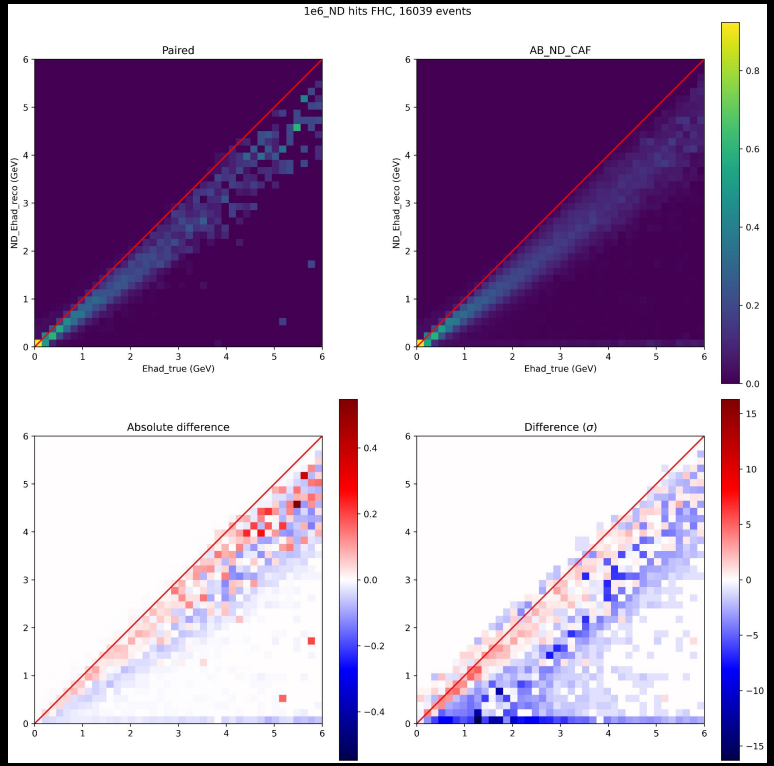


Old

FHC Ehad

New





DEEP UNDERGROUND NEUTRINO EXPERIMENT

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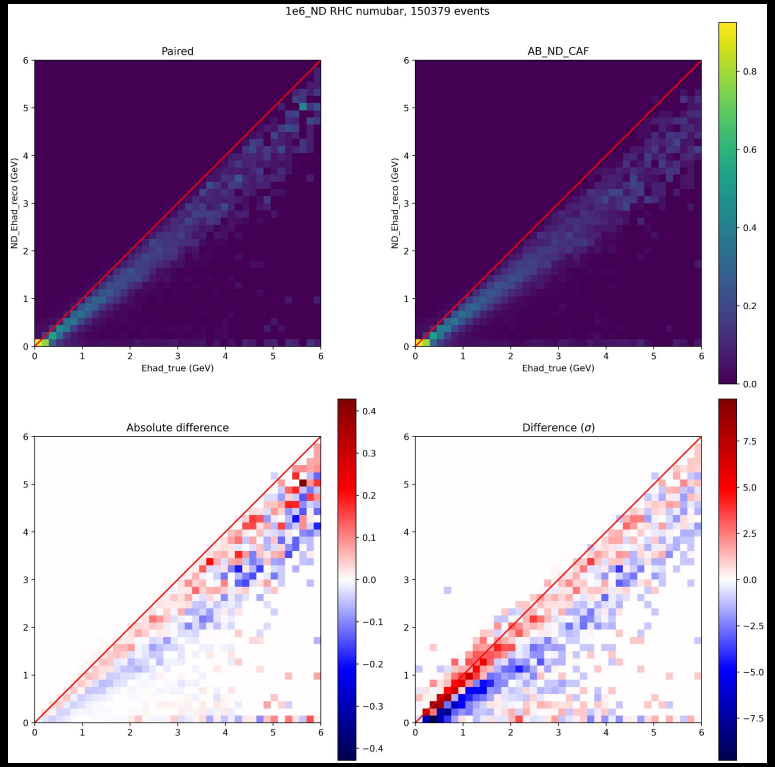
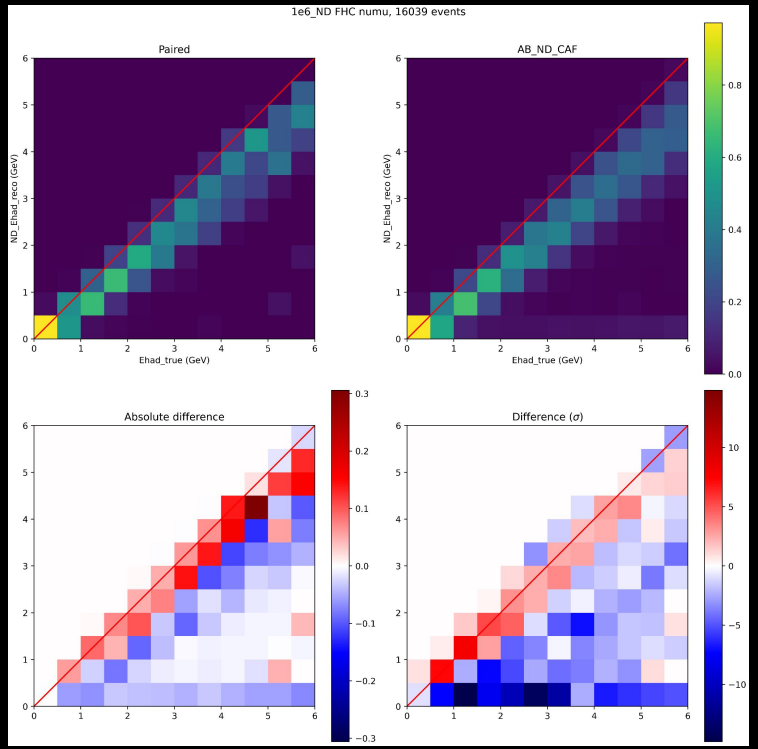
Old

FHC Ehad

New (coarser)





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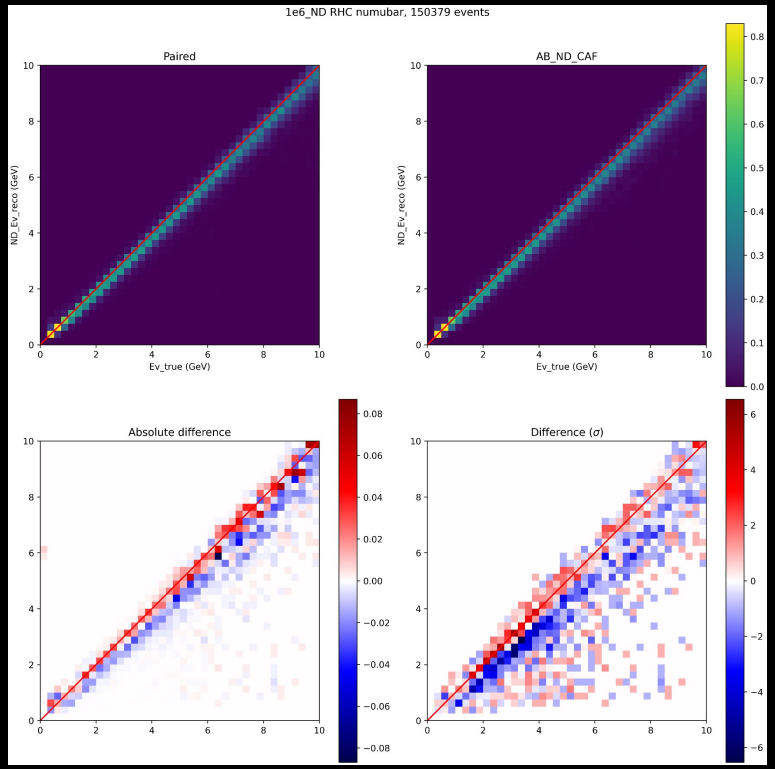
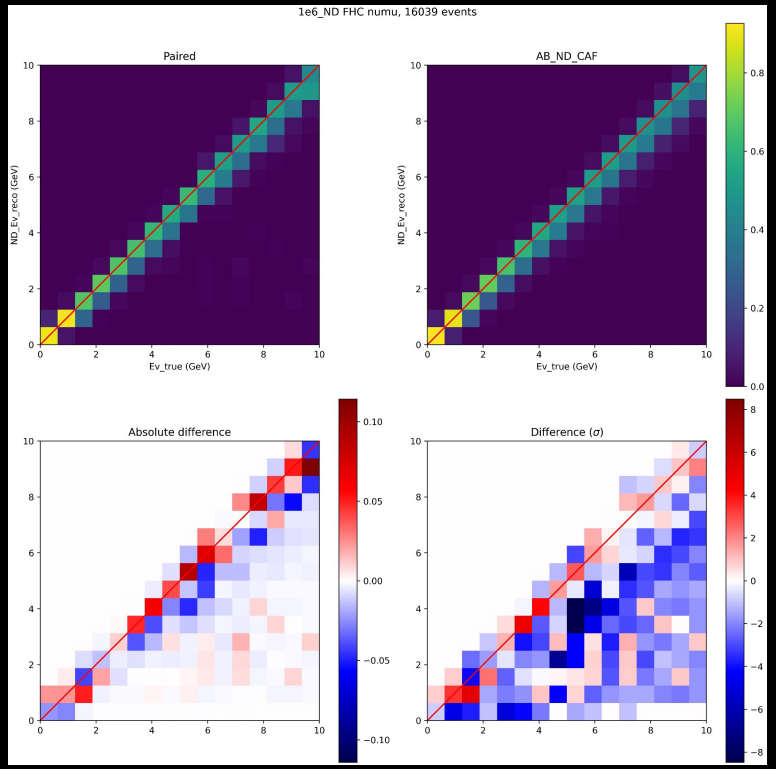
Old

FHC Enu

New (coarser)





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Colin Weber
Splitting Had. Hits
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