

5D Calorimetry

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Response Study

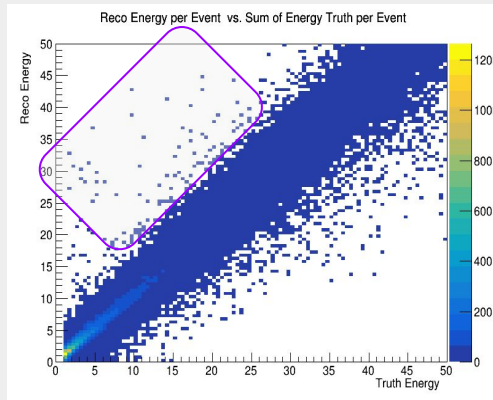
- ❖ Response Matrix: Creating a response matrix by computing the total truth energy and the total reco energy for each pion.
- ❖ Energy Comparison: Analyzing the relationship between the pion's total truth energy and total reco energy.
- ❖ Time Dependence: Visualizing the response matrix against the Pion reco Energy,
- ❖ Energy Range: Concentrating on events where the energy falls within the 1 GeV to 50 GeV interval.

Response Reco vs Truth

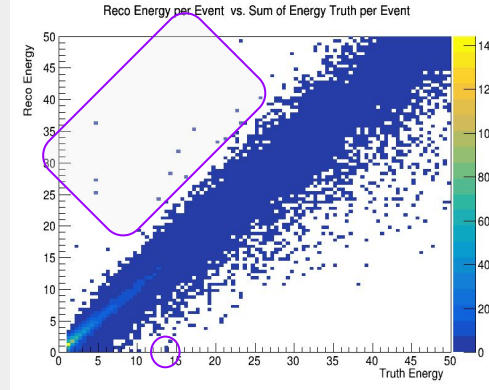
❖ Cuts has been applied in two levels

- Cell level
- Pion level

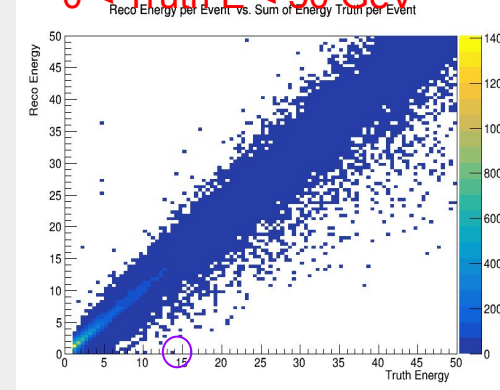
Cell level: **no cuts**
Pion level:
 $1 < \text{recoE} < 50 \text{ GeV}$
 $0 < \text{Truth E} < 50 \text{ GeV}$



Cell level:
 $\text{cellTime} \neq 0$
 $\text{cell reco E} > 0.001 \text{ GeV}$
Pion level:
 $1 < \text{recoE} < 50 \text{ GeV}$
 $0 < \text{Truth E} < 50 \text{ GeV}$



Cell level:
 $\text{cellTime} \neq 0$
 $\text{cell reco E} > 0.001 \text{ GeV}$
 $\text{cell truth E} > 0.001 \text{ GeV}$
Pion level:
 $1 < \text{recoE} < 50 \text{ GeV}$
 $0 < \text{Truth E} < 50 \text{ GeV}$



Ratio of Reco/Truth vs Reco with different cellTime Intervals

Cuts:

Cell level:

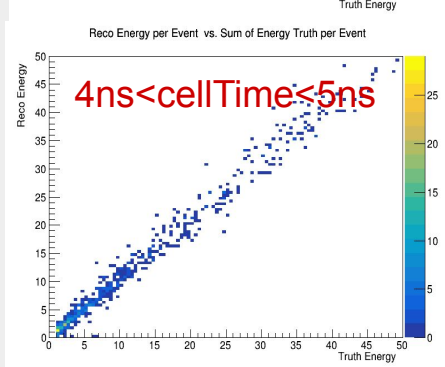
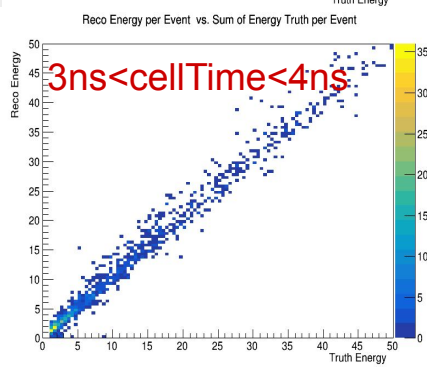
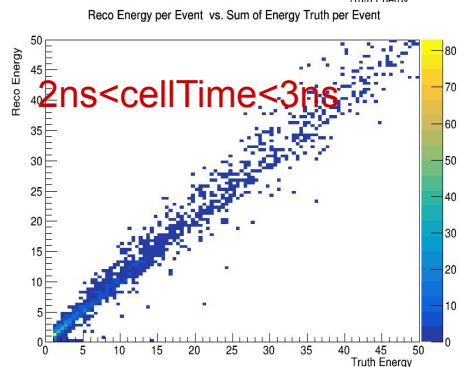
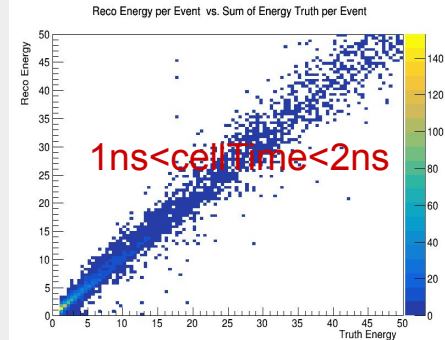
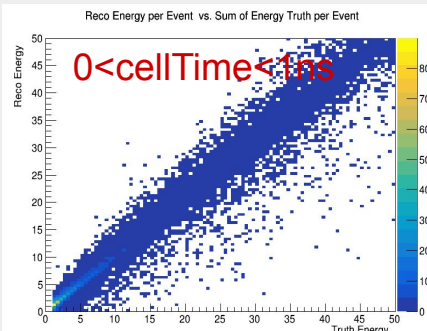
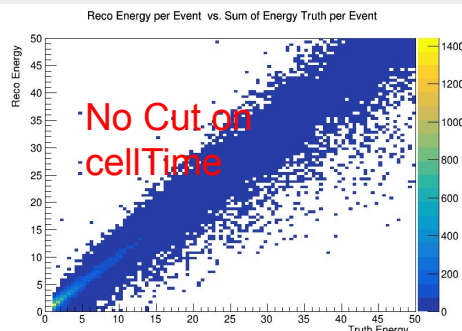
cellTime != 0

cell reco E > 0.001 GeV

Pion level:

recoE < 50 GeV

Truth E < 50 GeV



Response Reco vs Truth with different cellTime Interval

Cuts:

Cell level:

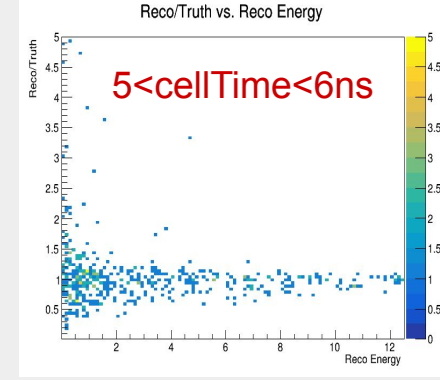
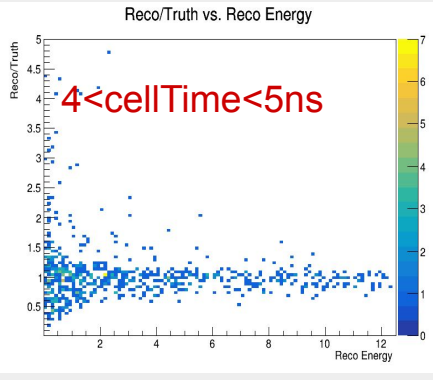
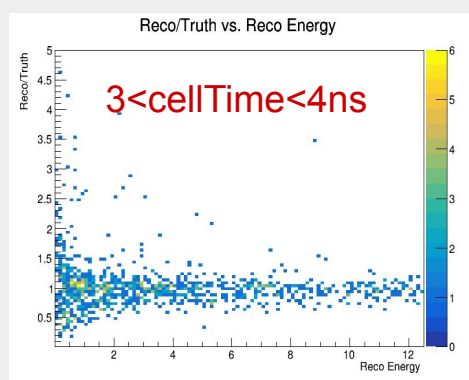
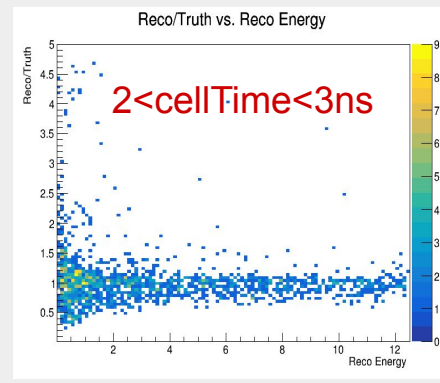
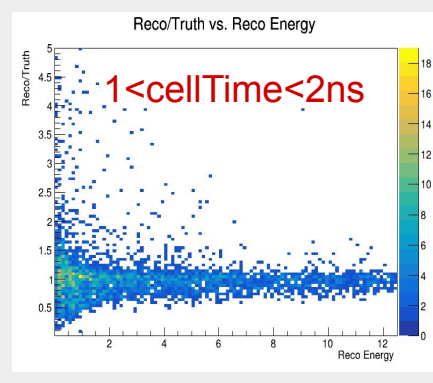
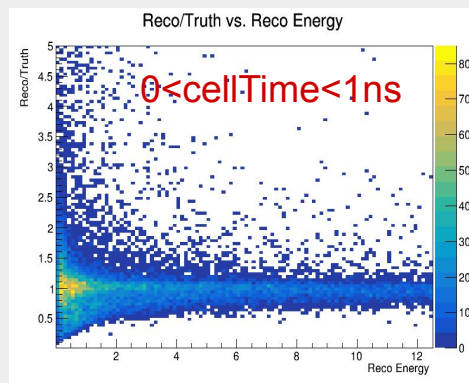
cellTime != 0

cell reco E > 0.001 GeV

Pion level:

recoE < 50 GeV

Truth E < 50 GeV



Pi 0 Ntuple validation (Cell E Reco vs Cell E Truth)

No Cuts

