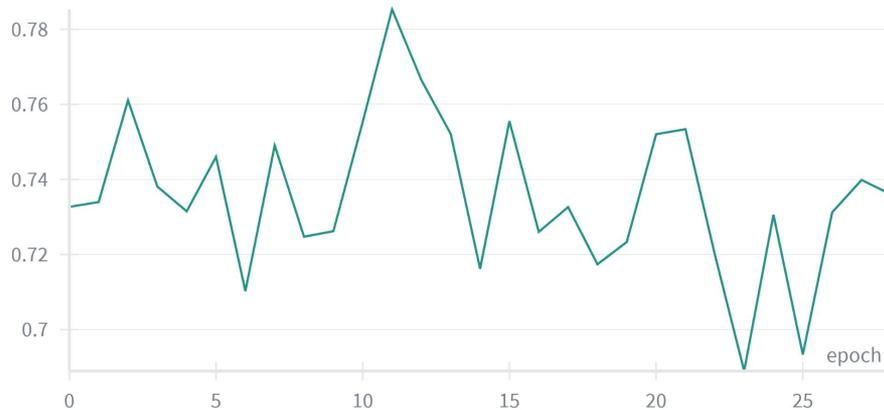train_loss
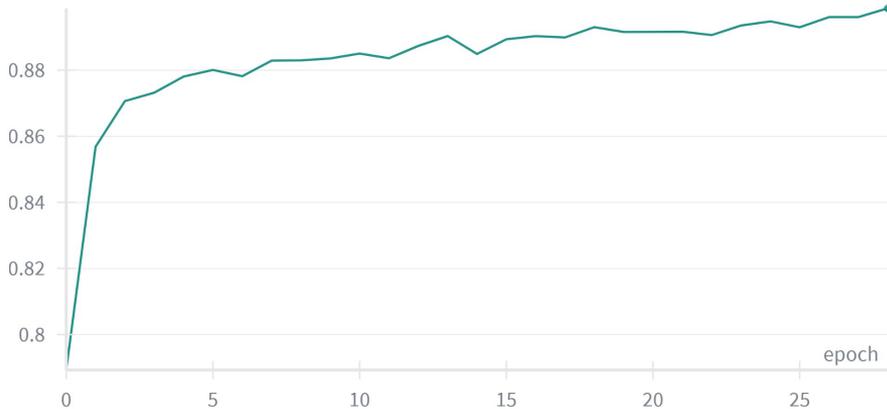
val_loss

$$L_{\text{energy,batch}} = \frac{1}{B} \sum_{i=1}^{B} \left(\hat{E}_{\text{inactive}}^{(i)} - E_{\text{inactive,true}}^{(i)} \right)^2$$

Energy in the inactive regions is **summed per spill**
Loss is calculated by **averaging over the batch**

train_energy_acc · val_energy_acc

$$\text{Energy Accuracy} = 1 - \frac{|E_{\text{pred,inactive}} - E_{\text{true,inactive}}|}{E_{\text{true,inactive}} + \epsilon}$$

Energy in the inactive regions is **summed per batch**
The energy accuracy per epoch is calculated as one relative absolute error

Energy in the inactive regions is **summed per spill**
Loss is calculated by **averaging over the batch**

Energy in the inactive regions is **summed per batch**
The energy accuracy per epoch is calculated as one relative absolute error
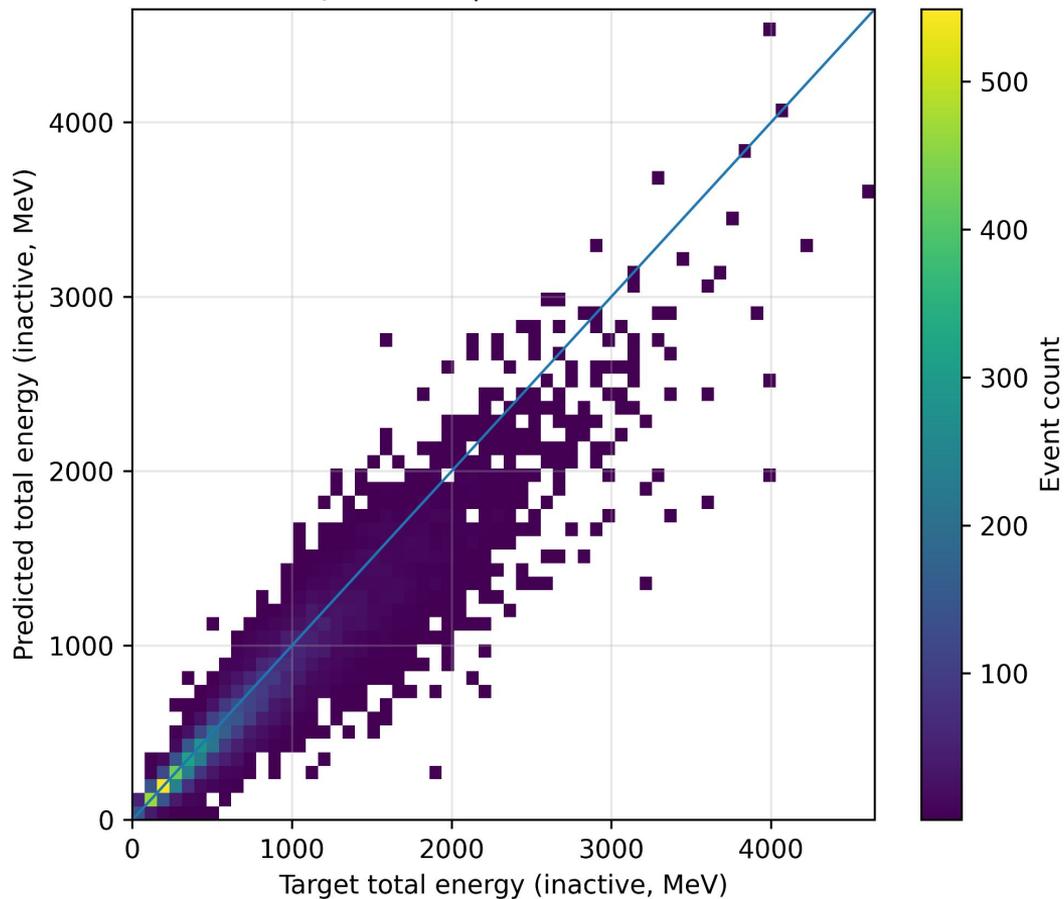
Not in sync! Example:
Batch 0, Spill 0 overpredicts by +100, Spill 1 underpredicts by -100

Loss will catch this as (+100)^2 + (-100)^2, but the two will cancel out during accuracy calculations (+100 + -100 = 0)

Inactive-region total energy: LArDRIP PREDICTION vs TARGET
epoch=22 | detector=2x2
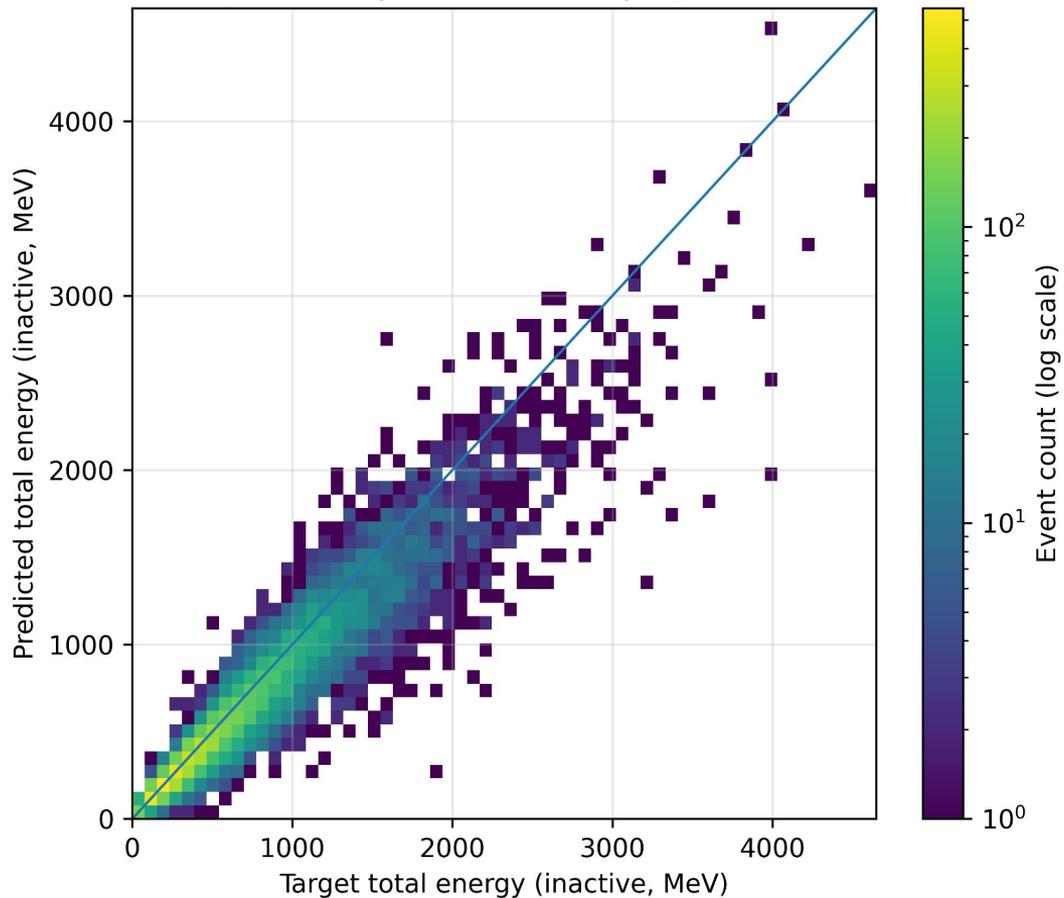
2x2-like
7 cm inactive
width

Current

Inactive-region total energy: LArDRIP PREDICTION vs TARGET
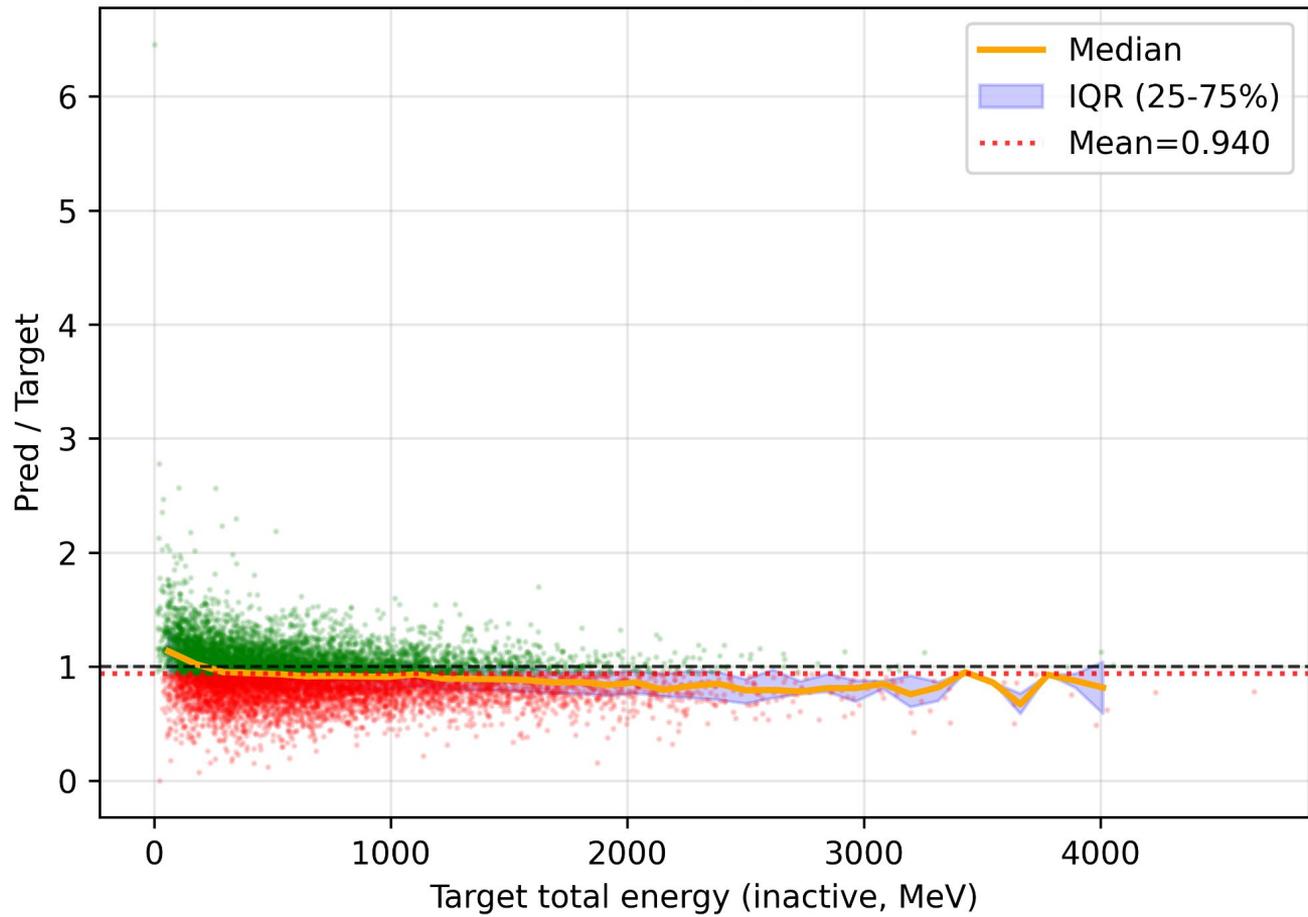epoch=22 | detector=2x2 | log counts

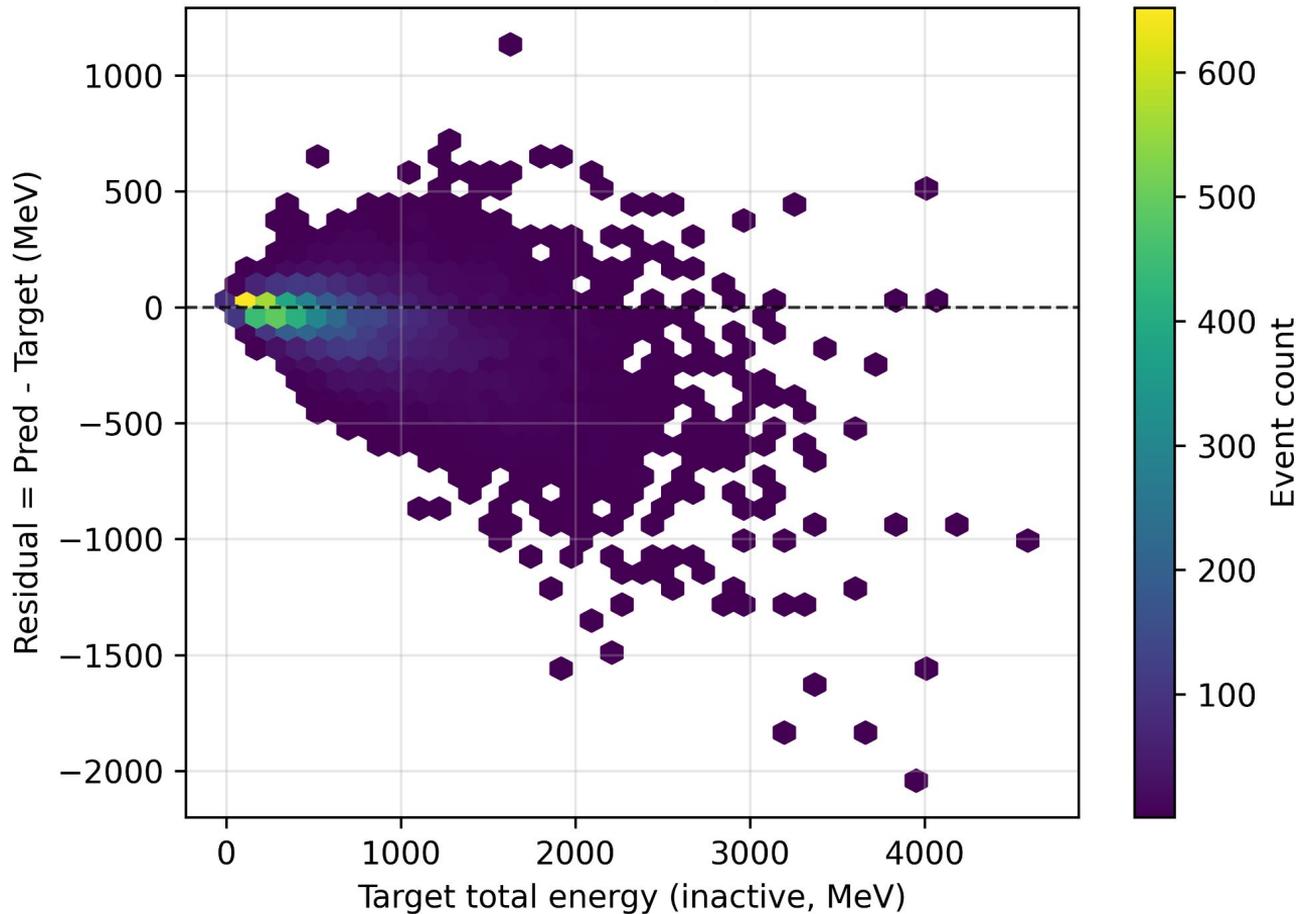2x2-like
7 cm inactive
width

Current

2x2-like
7 cm inactive
width

Current

Ratio vs Target | epoch=22

Pred / Target

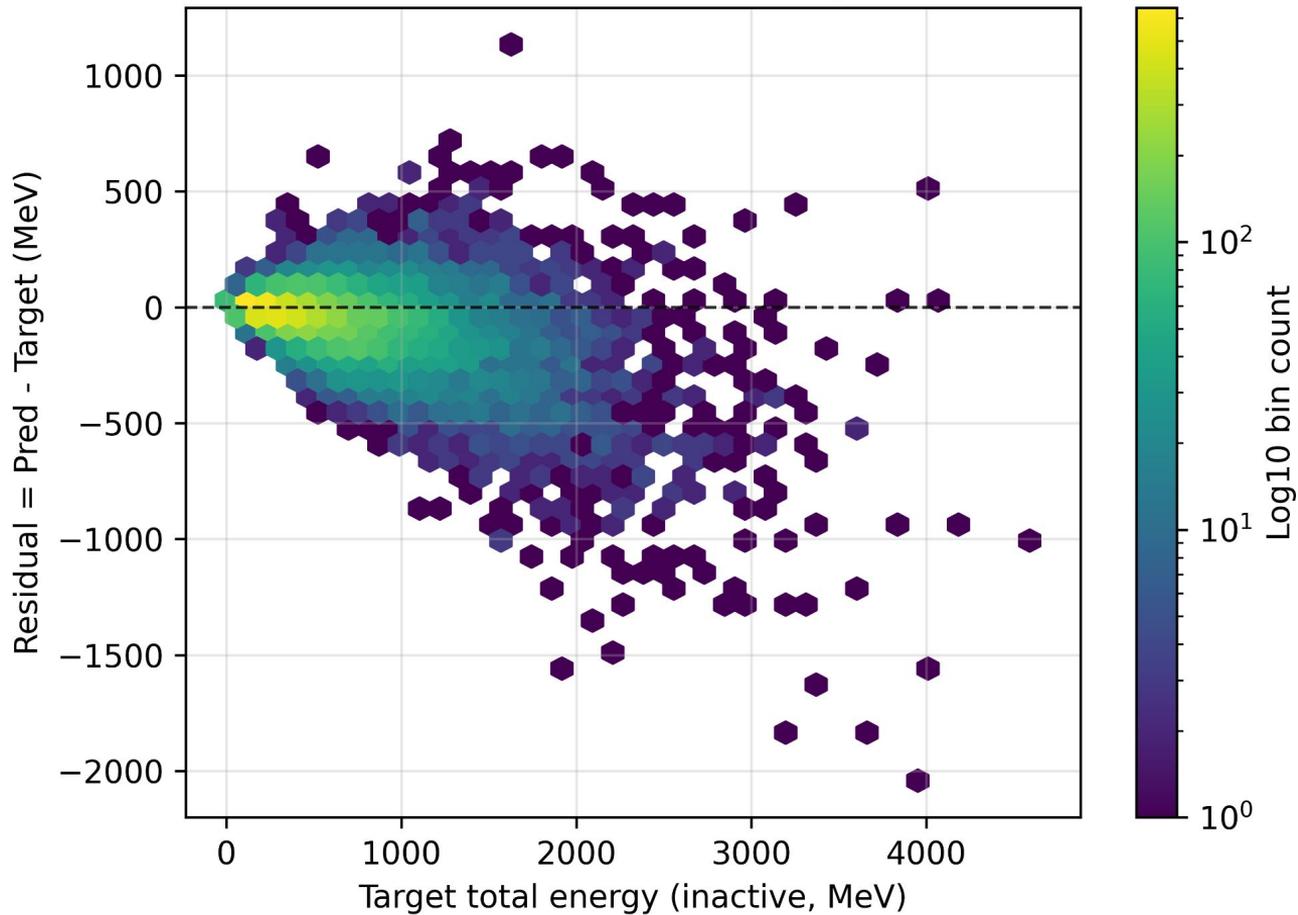Target total energy (inactive, MeV)

Median
IQR (25-75%)
Mean=0.940

2x2-like
7 cm inactive
width

Current

Residuals vs Target | epoch=22

Residuals vs Target (log counts) | epoch=22

2x2-like
7 cm inactive
width

Current

Energy Distribution Comparison | epoch=22
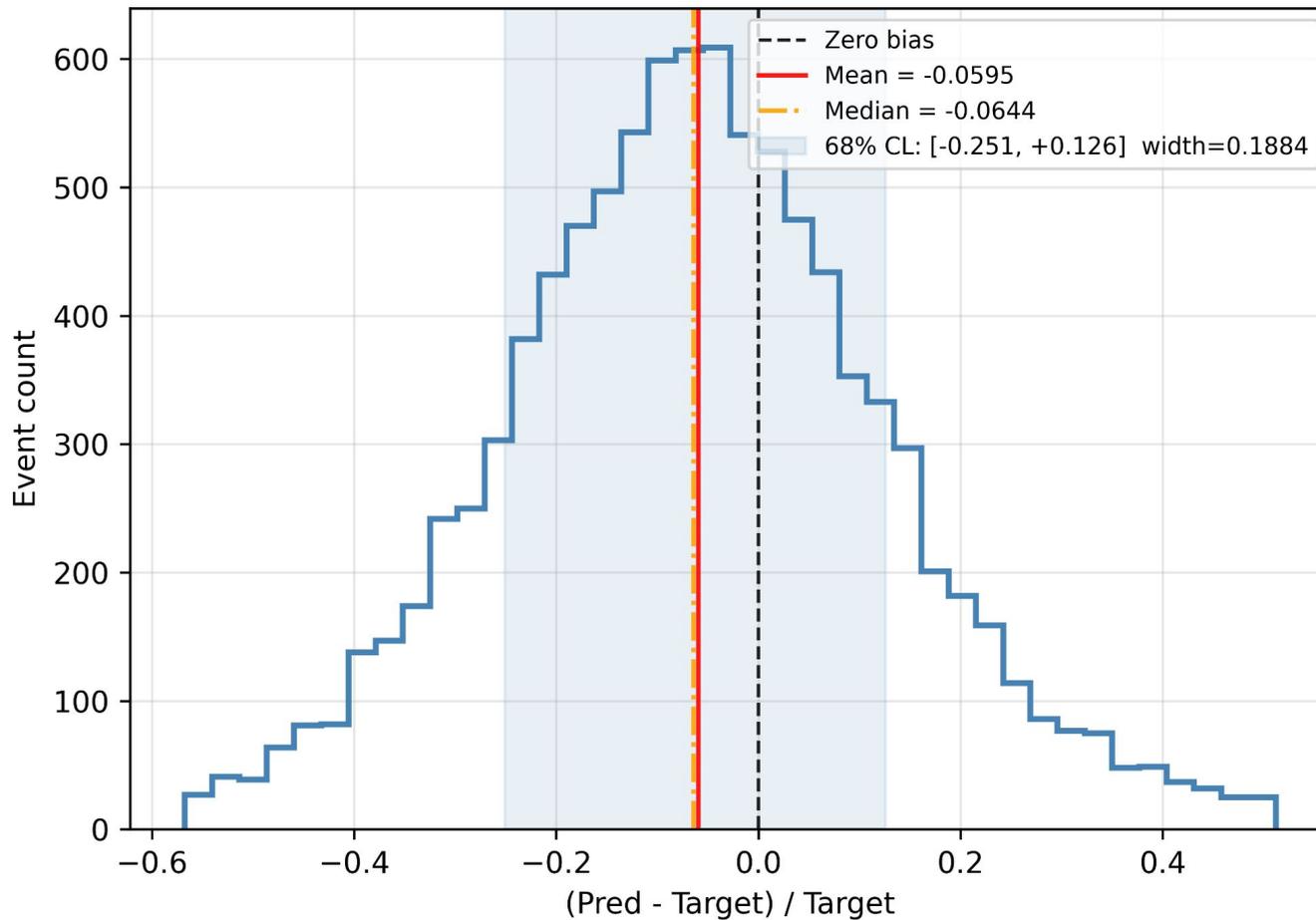
2x2-like
7 cm inactive
width

Current

2x2-like
7 cm inactive
width
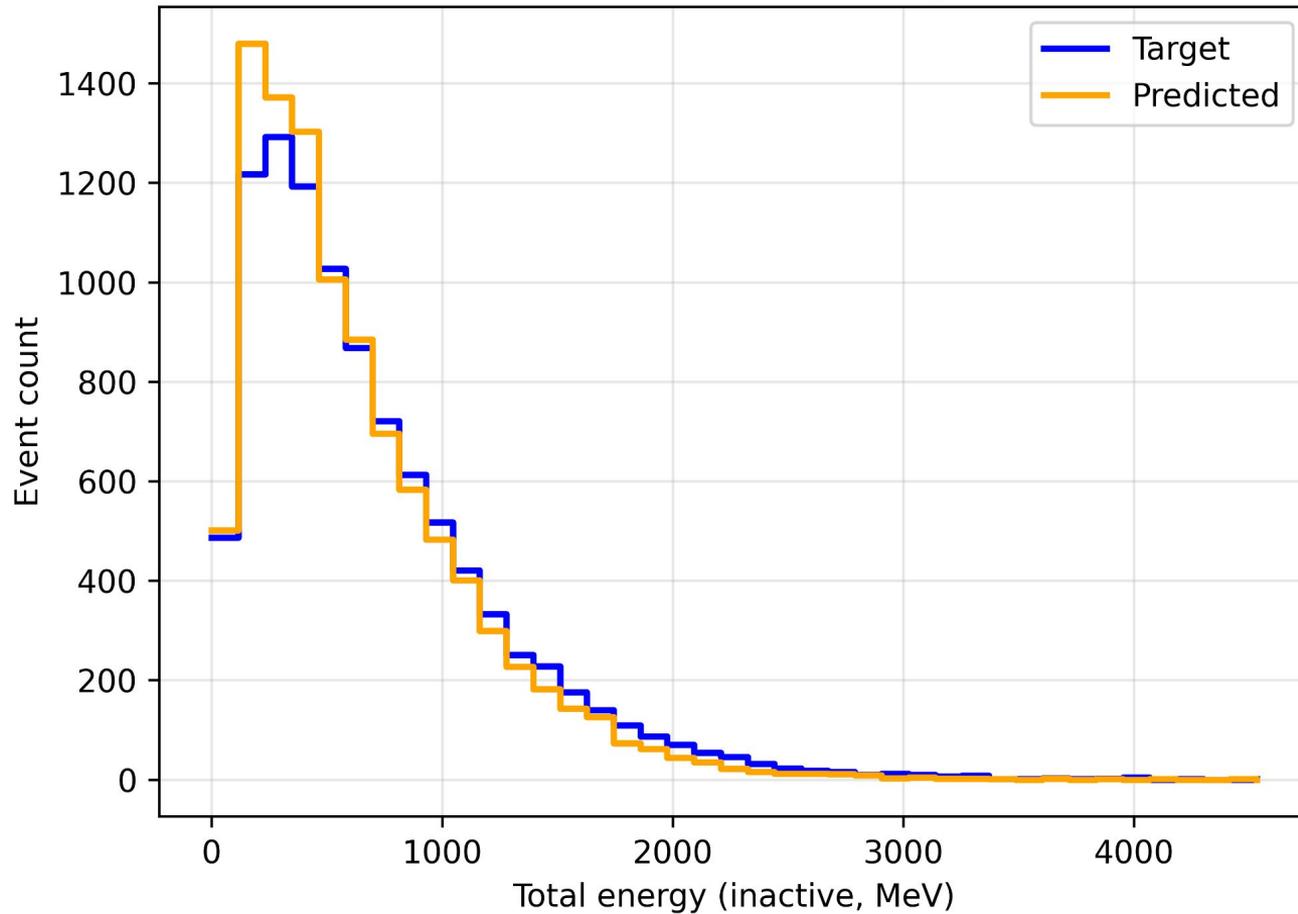
Current

Energy resolution: (Pred - Target) / Target | epoch=22

- - - Zero bias
— Mean = -0.0595
— · — Median = -0.0644
68% CL: [-0.251, +0.126] width=0.1884

Energy resolution vs Target energy | epoch=22

2x2-like
7 cm inactive
width
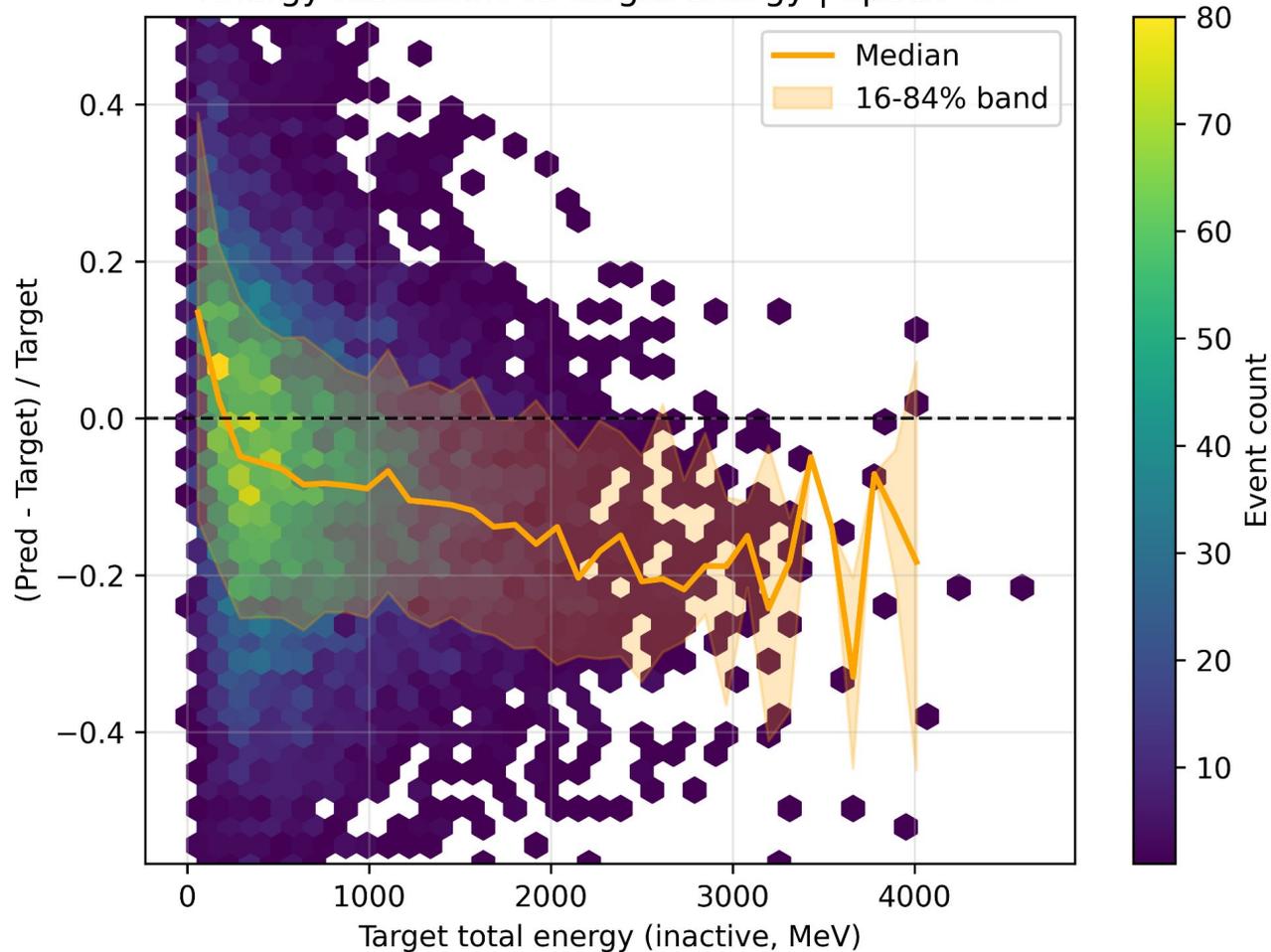
Current

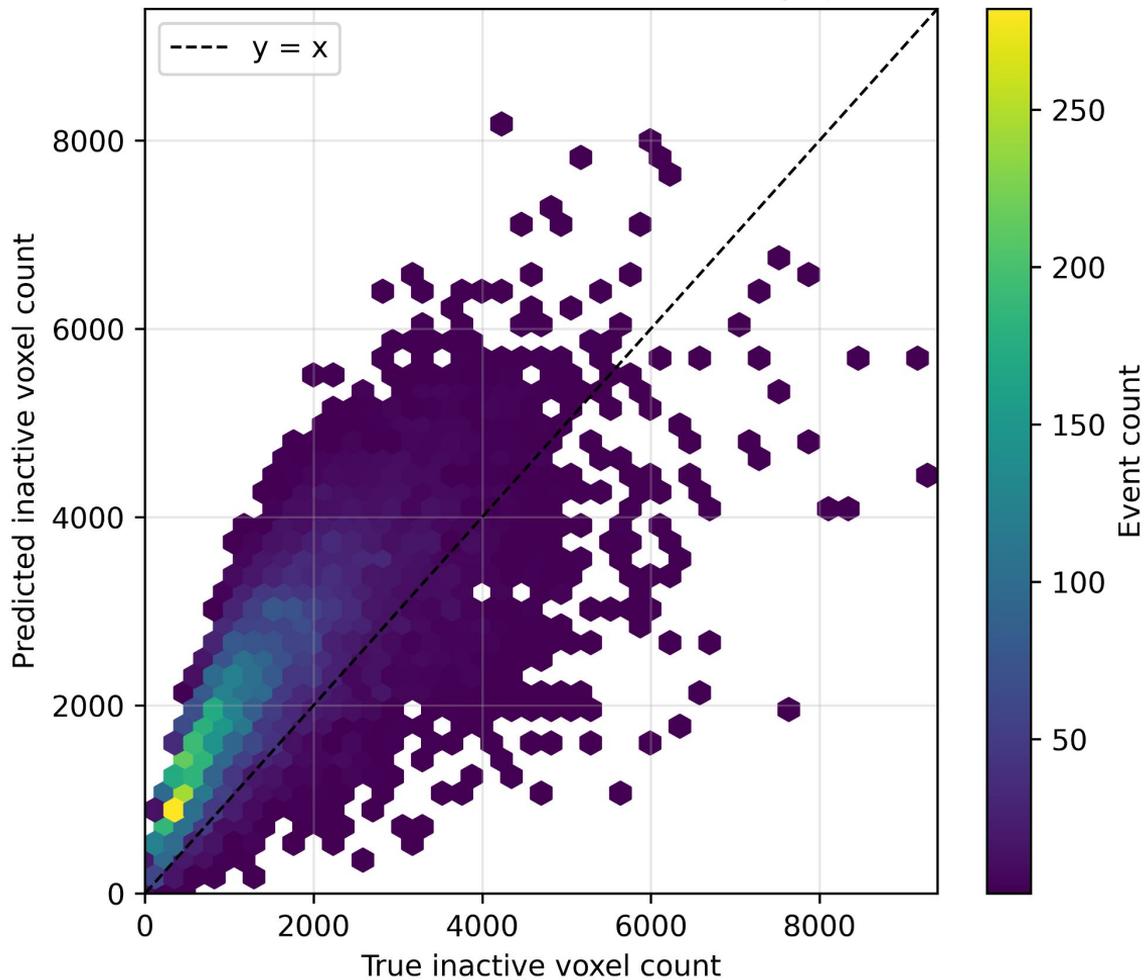Energy residual vs Count residual | epoch=22
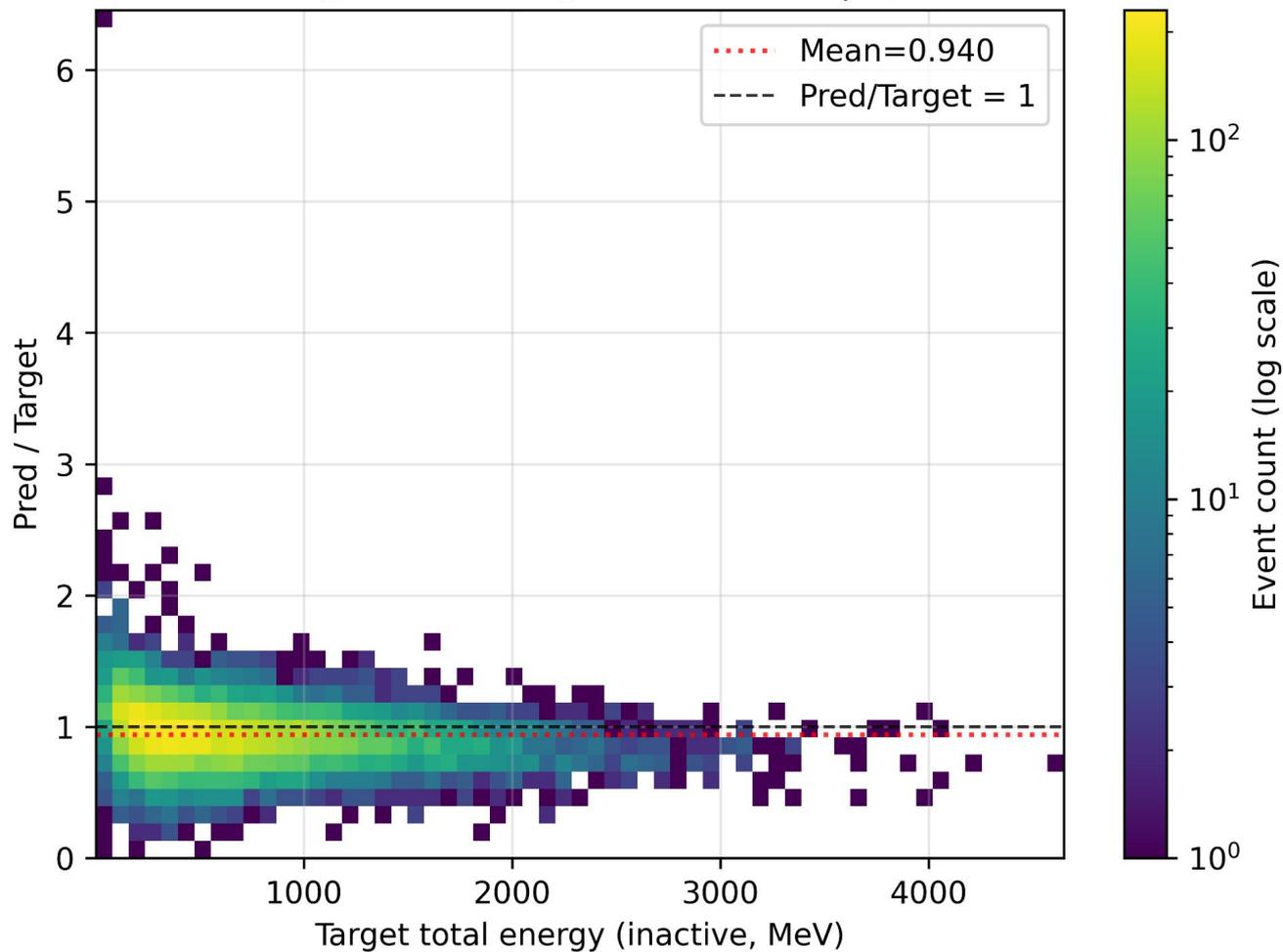
2x2-like
7 cm inactive
width
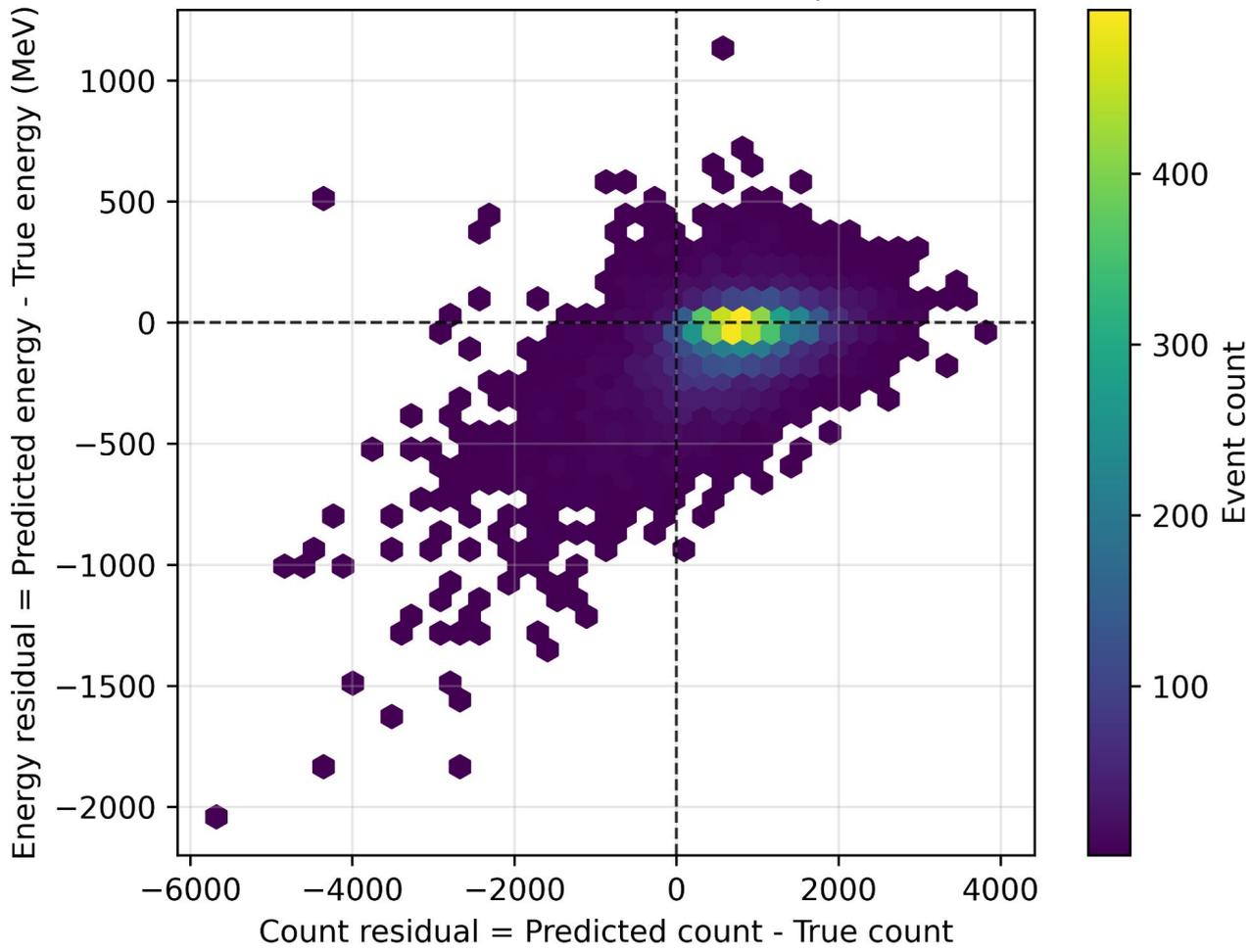
Current

Inactive voxel count: Predicted vs True | epoch=22

2x2-like
7 cm inactive
width

Current
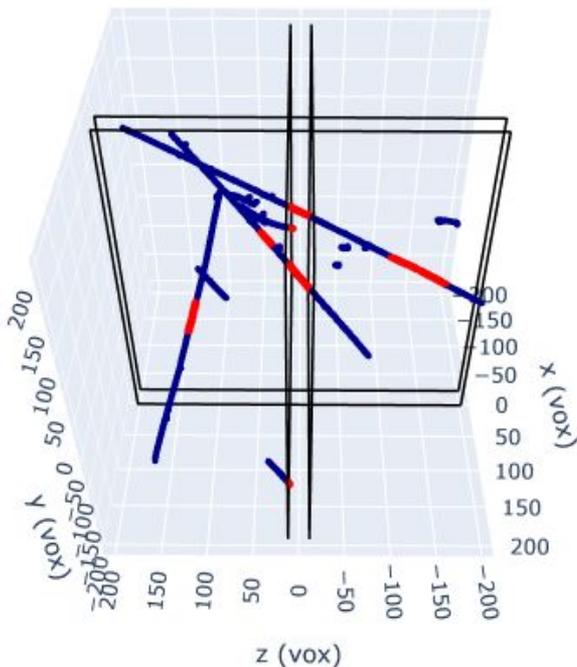
Ratio vs Target (2D histogram, linear x) | epoch=22
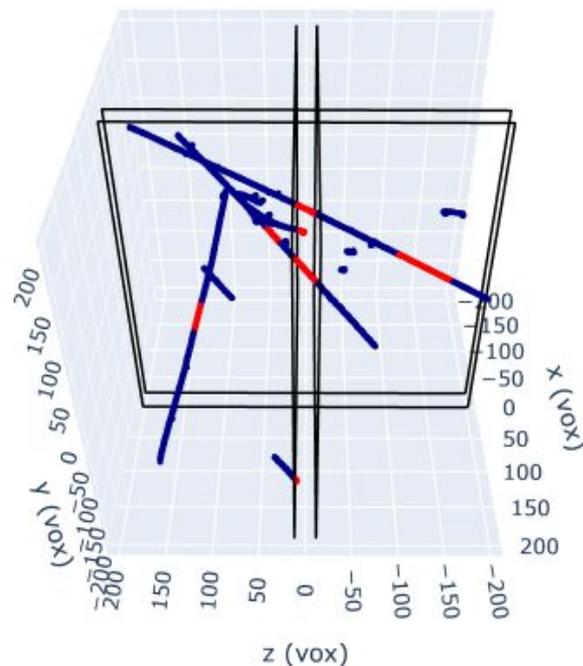
2x2-like
7 cm inactive
width

Current

Pred / Target

Target total energy (inactive, MeV)

Event count (log scale)

Mean=0.940
Pred/Target = 1

2x2-like
7 cm inactive
width

PREDICTION (inactive=pred, active=input)
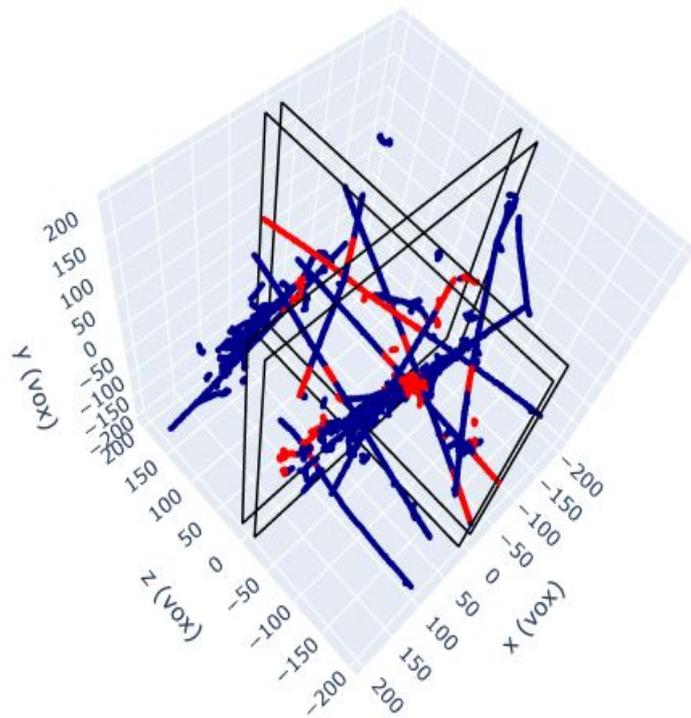
TARGET

Current

2x2-like
7 cm inactive
width

Current
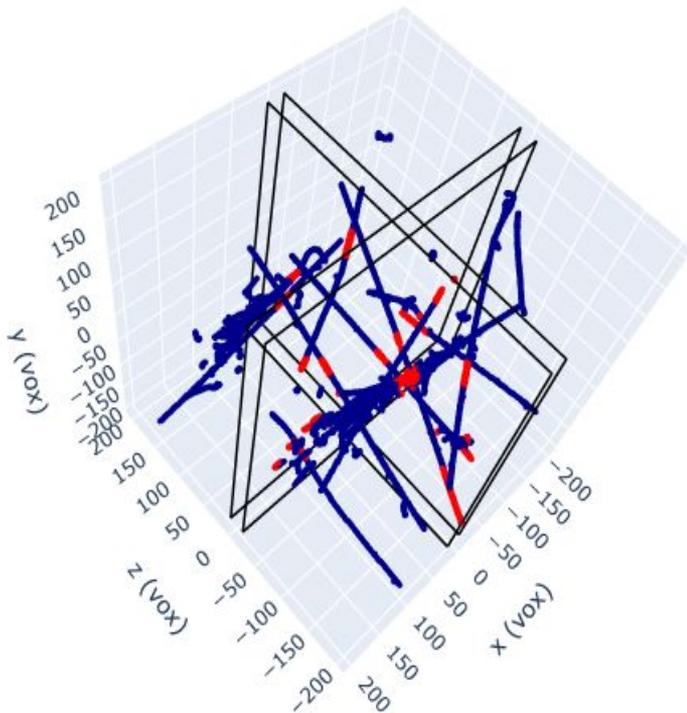
Predicted Energy:
930.4 MeV

True Energy:
1108 MeV

PREDICTION (inactive=pred, active=input)

TARGET

2x2-like
7 cm inactive
width

Predicted Energy:
909 MeV

True Energy:
1086 MeV
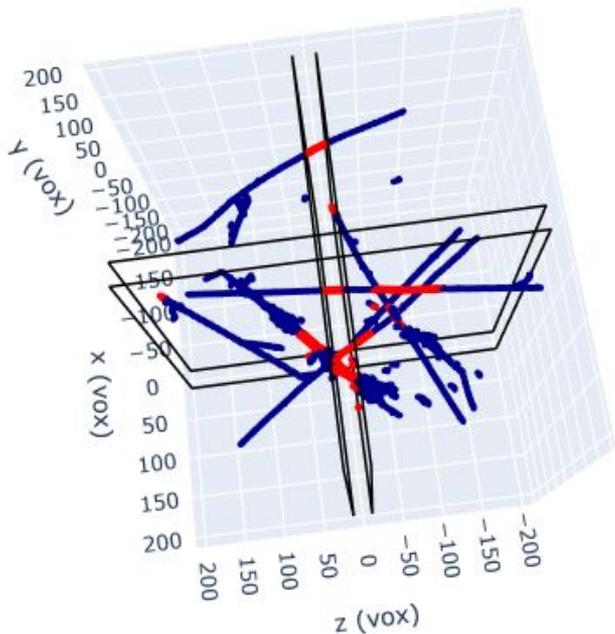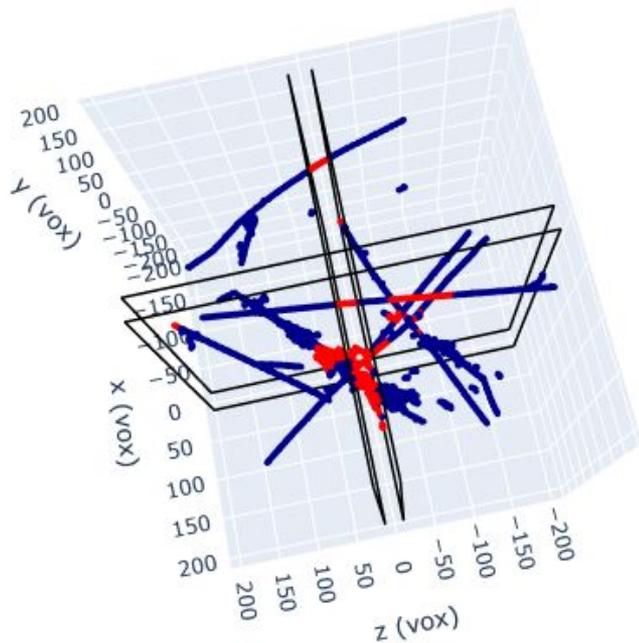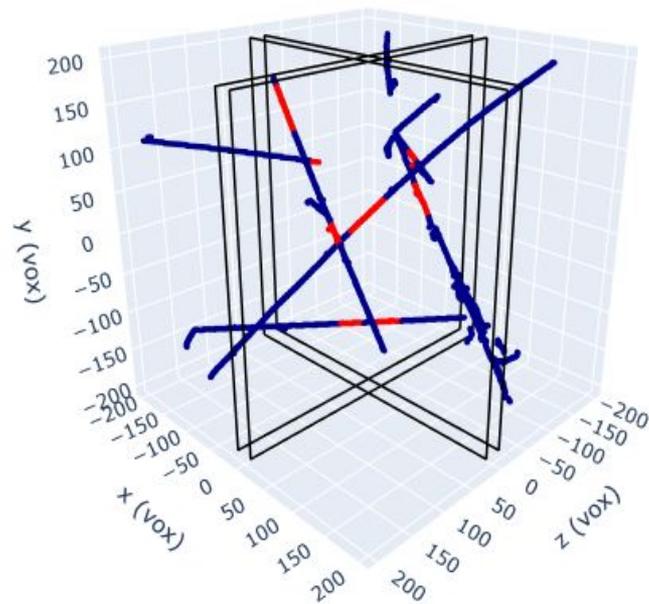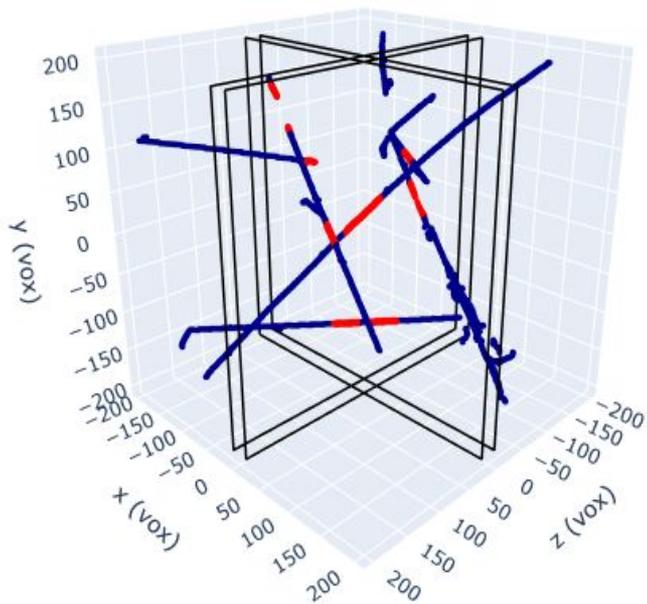
PREDICTION (inactive=pred, active=input)

TARGET

Current

2x2-like
7 cm inactive
width

Current

Predicted Energy:
239.4 MeV

PREDICTION (inactive=pred, active=input)

True Energy:
236.1 MeV

TARGET
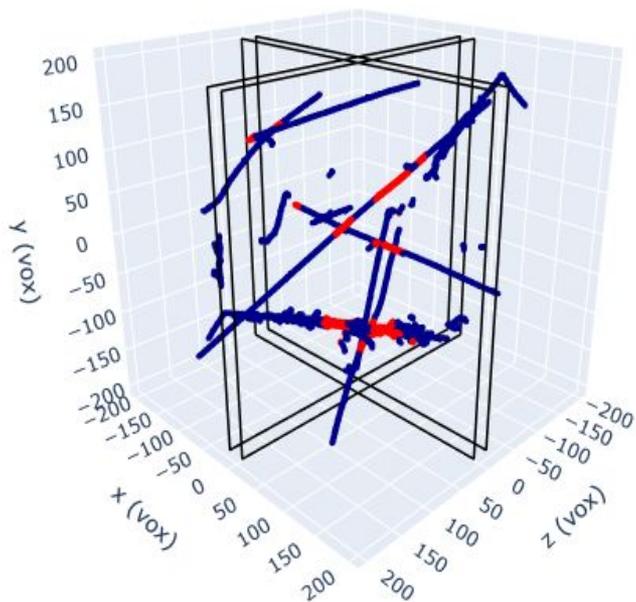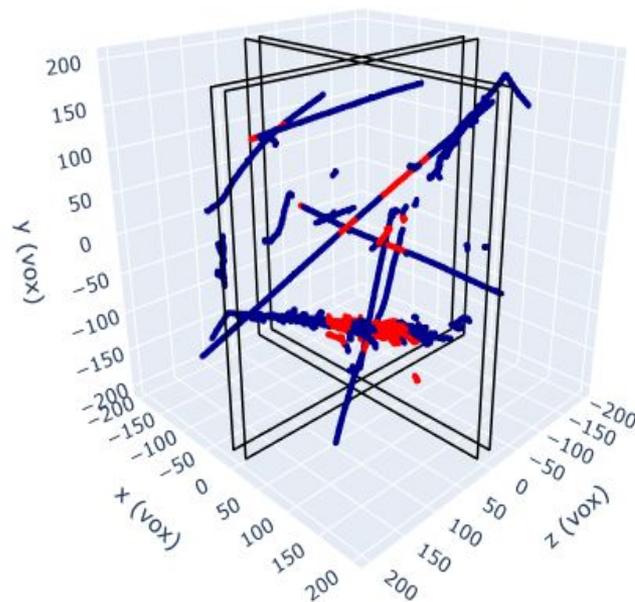
2x2-like
7 cm inactive
width

Current

Predicted Energy:
909 MeV

PREDICTION (inactive=pred, active=input)

True Energy:
1086 MeV

TARGET

END