Near to Far Update
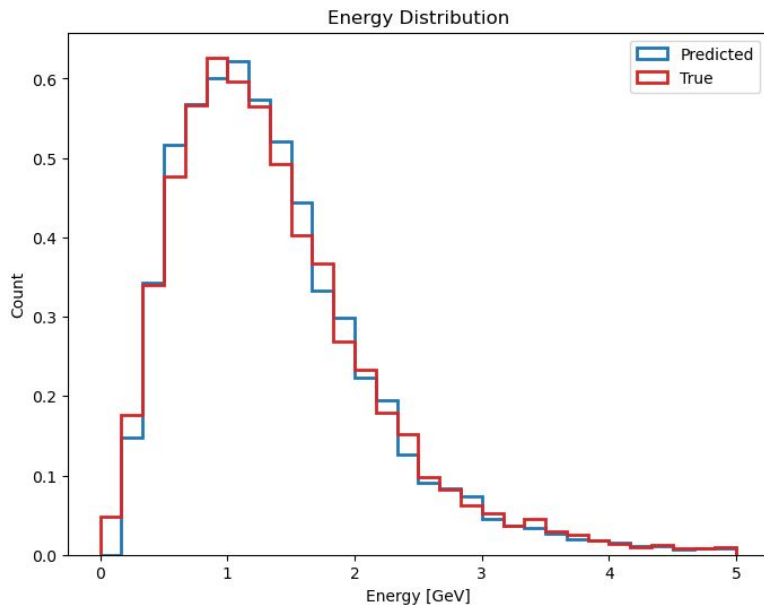
October 27 2023
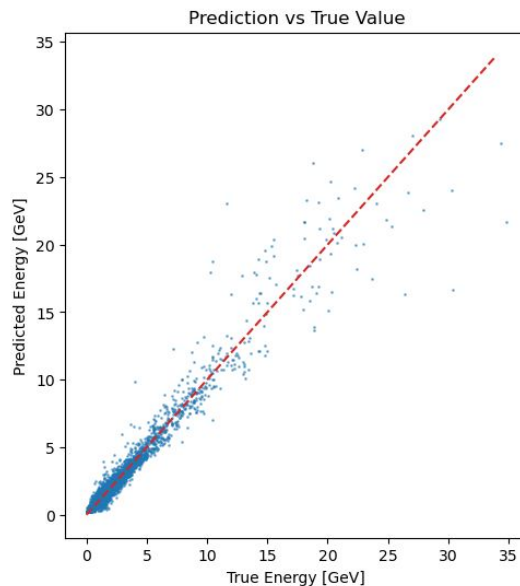
Radi Radev

BDT Results
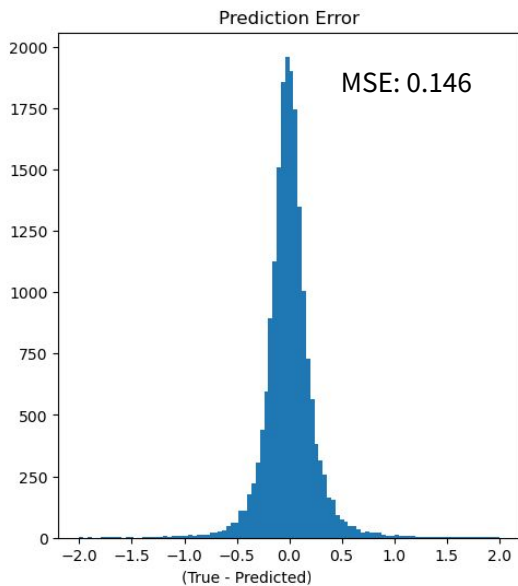


```
'eRecoP', 'eRecoN', 'eRecoPip',
'eRecoPim', 'eRecoPi0', 'eRecoOther',
'Ev_reco', 'Elep_reco', 'theta_reco'
```

BDT

```
'fc_nc_nu_E'
```

Changing the target to the neutral current reconstructed energy hypothesis as suggested by Alex, improved the results a lot. 😃
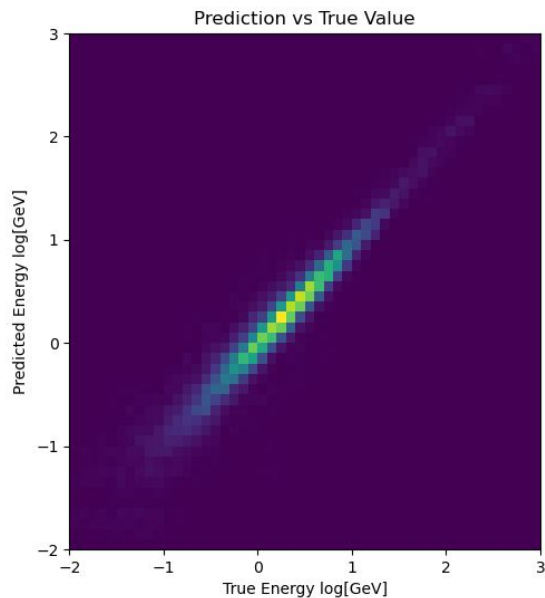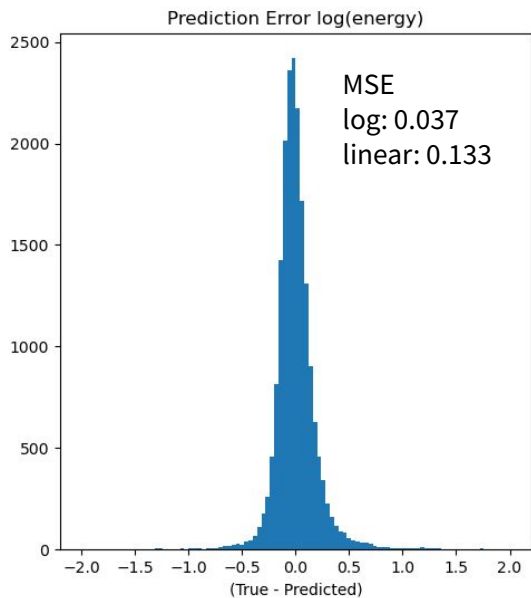
BDT Results

Prediction Error

MSE: 0.146

Prediction vs True Value

```
'eRecoP', 'eRecoN', 'eRecoPip',
'eRecoPim', 'eRecoPi0', 'eRecoOther',
'Ev_reco', 'Elep_reco', 'theta_reco'
```

BDT

```
'fc_nc_nu_E'
```

BDT Results

Prediction Error log(energy)

MSE
log: 0.037
linear: 0.133

Prediction vs True Value

```
'eRecoP', 'eRecoN', 'eRecoPip',
'eRecoPim', 'eRecoPi0', 'eRecoOther',
'Ev_reco', 'Elep_reco', 'theta_reco'
```
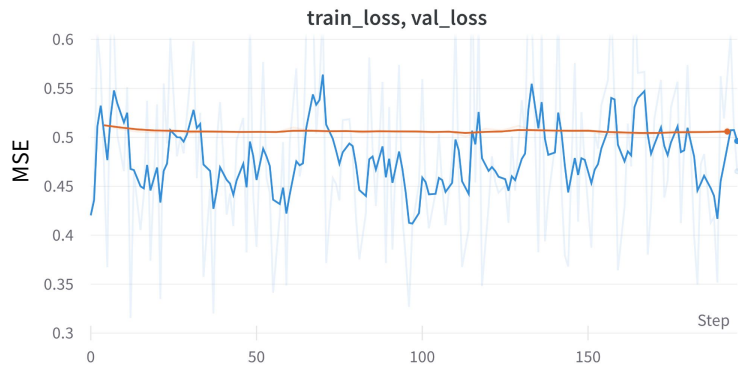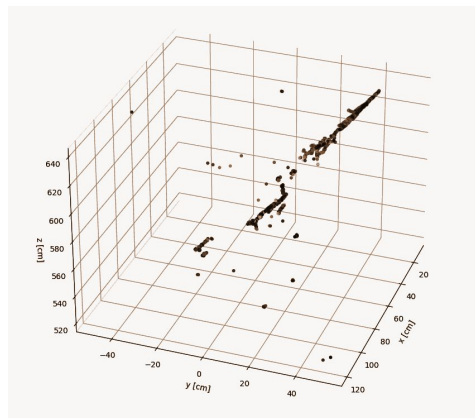
BDT

```
log('nc_nu_E)
```

Slight improvement with log of energy as the target.

MSE: 0.146 (trained with linear energy target) from previous slide

NN Results?

Sparse NN

`'fc_nc_nu_E'`

- doesn't seem to be converging at all
- validation loss an order of magnitude higher than BDT 😦
- Thought it might be an issue matching larnd-sim files to the reco information, however I check that the vertex matches between both
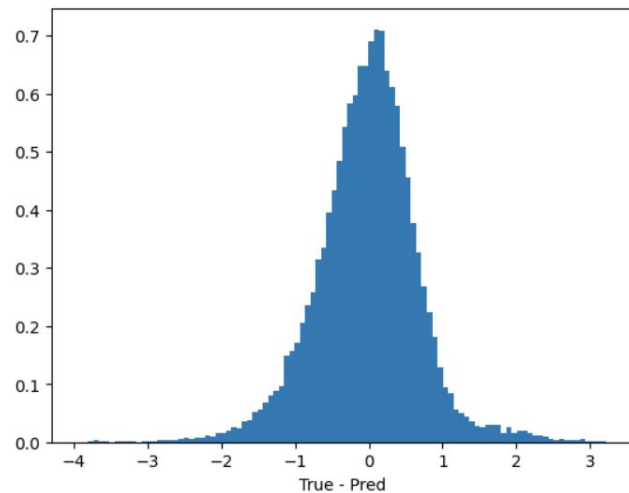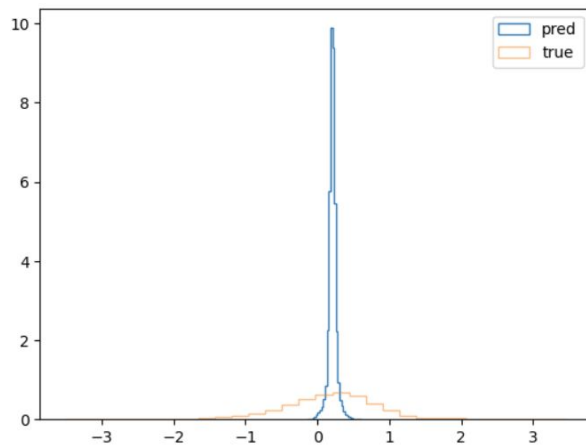
Extra

A nice picture before some not so nice ones

NN Preds

Network is only a small range of values around the mean of the true energy distribution - something going very wrong 😵

BDT log energy distributions