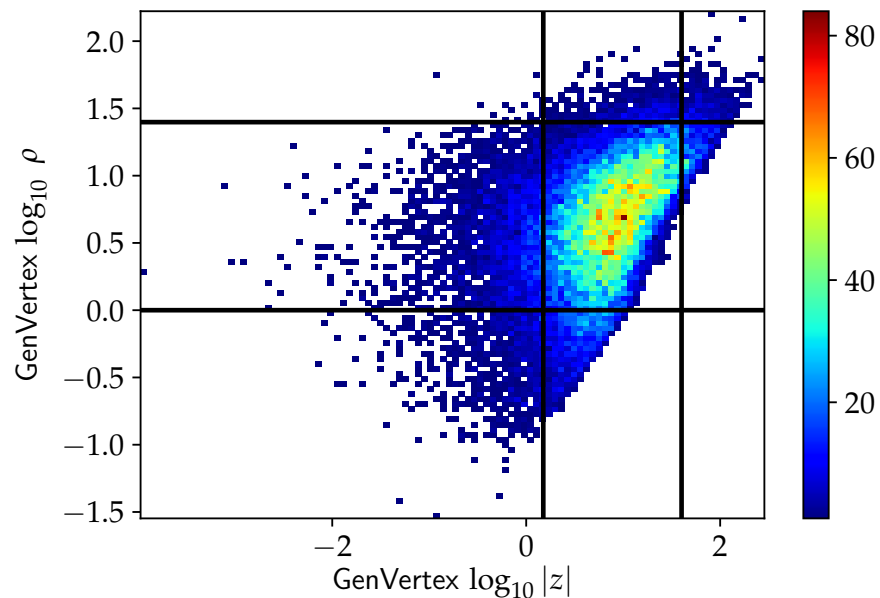


# 2D – Histogram

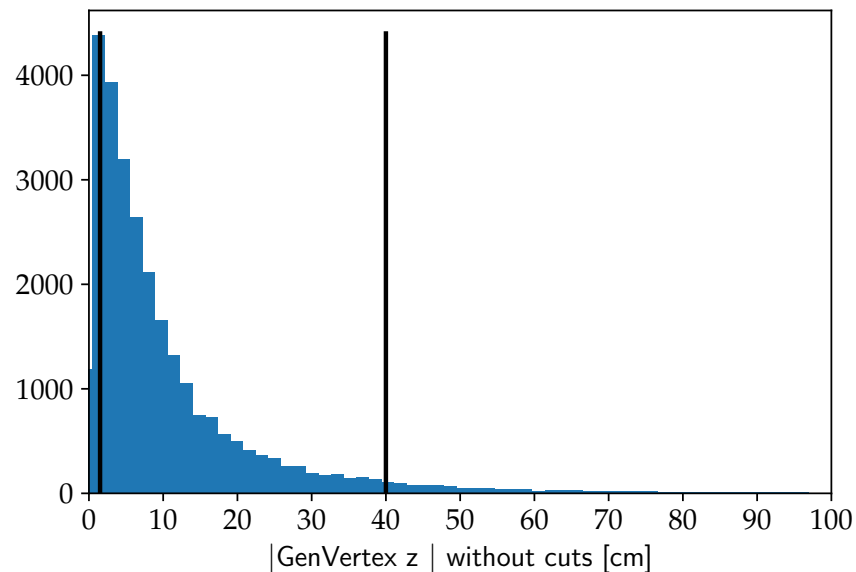
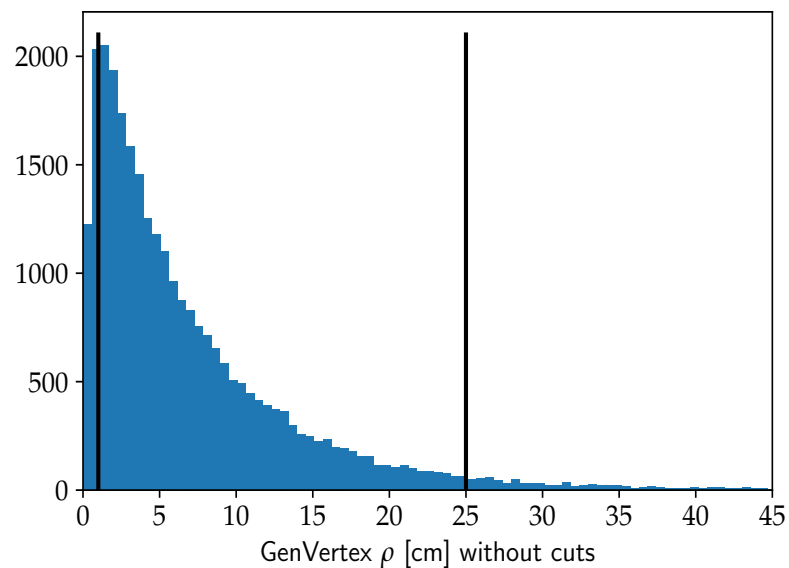
Cuts on GenVertices (labels of dataset):

- $1\text{cm} < \rho < 25\text{cm}$
- $1.5\text{cm} < z < 40\text{cm}$

20347 GenVertices selected out of 27942 events in total.

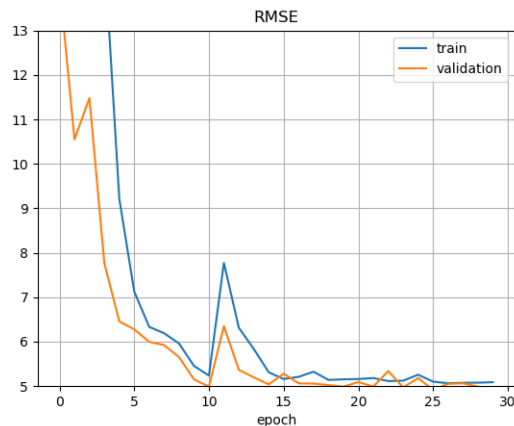


# 1D – projections of 2D – histogram



# FCN: Result of 2D – Cuts

- (Result is reproducible as well.)



Final evaluation on **train-dataset**: [24.56, 4.96]  
Final evaluation on **test-dataset** : [23.62, 4.86]

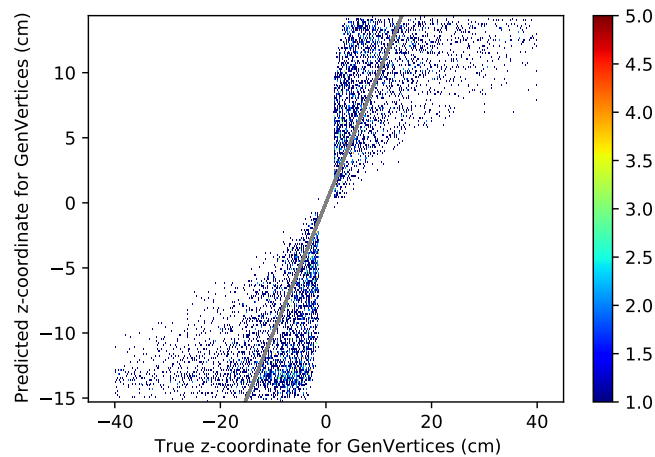
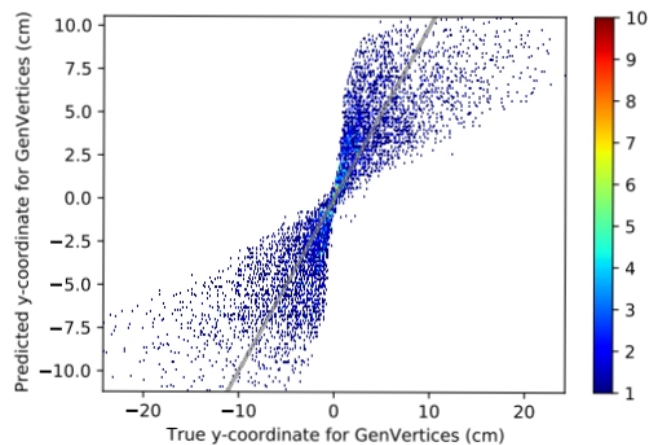
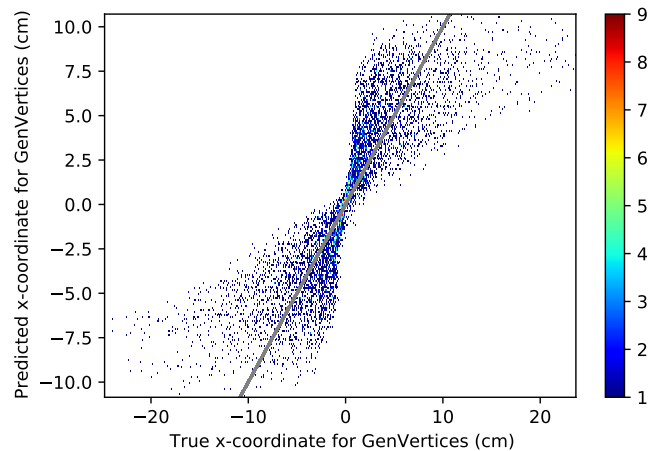
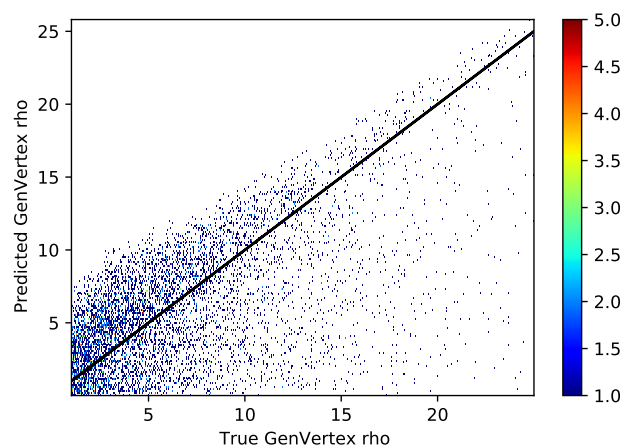


*Without 2D – cuts (last week):*

*Final evaluation on **train-dataset**: [142.70, 11.95]  
Final evaluation on **test-dataset**: [148.25, 12.18]*

(RMSE-plot for reproducible result)

# FCN: Predicted-vs-True-Plots



# Problems with PNet

- In Jupyter-environment, *batch\_size* cannot be increased too much, reason: `ResourceExhaustedError` (current *batch\_size* = 26)
- Solution: Move to HTCondor with Tesla P/V100 (for more RAM)? [default PNet:1024]
- Loss-function = *MSE*, metric = *RMSE* → metric should be  $\sqrt{\text{loss}}$  of loss-function, right?

```
Epoch 1/12
20332/20347 [=====>.] - ETA: 0s - loss: 81.4927 - rmse: 9.0275
Epoch 00001: val_rmse improved from inf to 9.01908, saving model to /nfs/dust/cms/user/shekhzai/ParticleNet-LLP-fork/tf-keras/RegressionProblemWithKarla/refurbedTrainings/GenVerticesUnprocessed/PNet-03-08-2020/2D_cuts-03-08-2020/model_checkpoints/particle_net_model.001.h5
20347/20347 [=====] - 405s 20ms/sample - loss: 81.4943 - rmse: 9.0275 - val_loss: 80.4468 - val_rmse: 9.0191
[2020-08-04 18:56:13,280] INFO: Learning rate: 0.001000
Epoch 2/12
20332/20347 [=====>.] - ETA: 0s - loss: 81.2479 - rmse: 9.0078
Epoch 00002: val_rmse improved from 9.01908 to 9.01057, saving model to /nfs/dust/cms/user/shekhzai/ParticleNet-LLP-fork/tf-keras/RegressionProblemWithKarla/refurbedTrainings/GenVerticesUnprocessed/PNet-03-08-2020/2D_cuts-03-08-2020/model_checkpoints/particle_net_model.002.h5
20347/20347 [=====] - 404s 20ms/sample - loss: 81.2511 - rmse: 9.0078 - val_loss: 80.4854 - val_rmse: 9.0106
```

# Outlook for next week

- We want the model to be able to connect **RecHits** from different layers 1, 2, 3 etc., and not only stay in a fixed layer and only connect the knn there.

