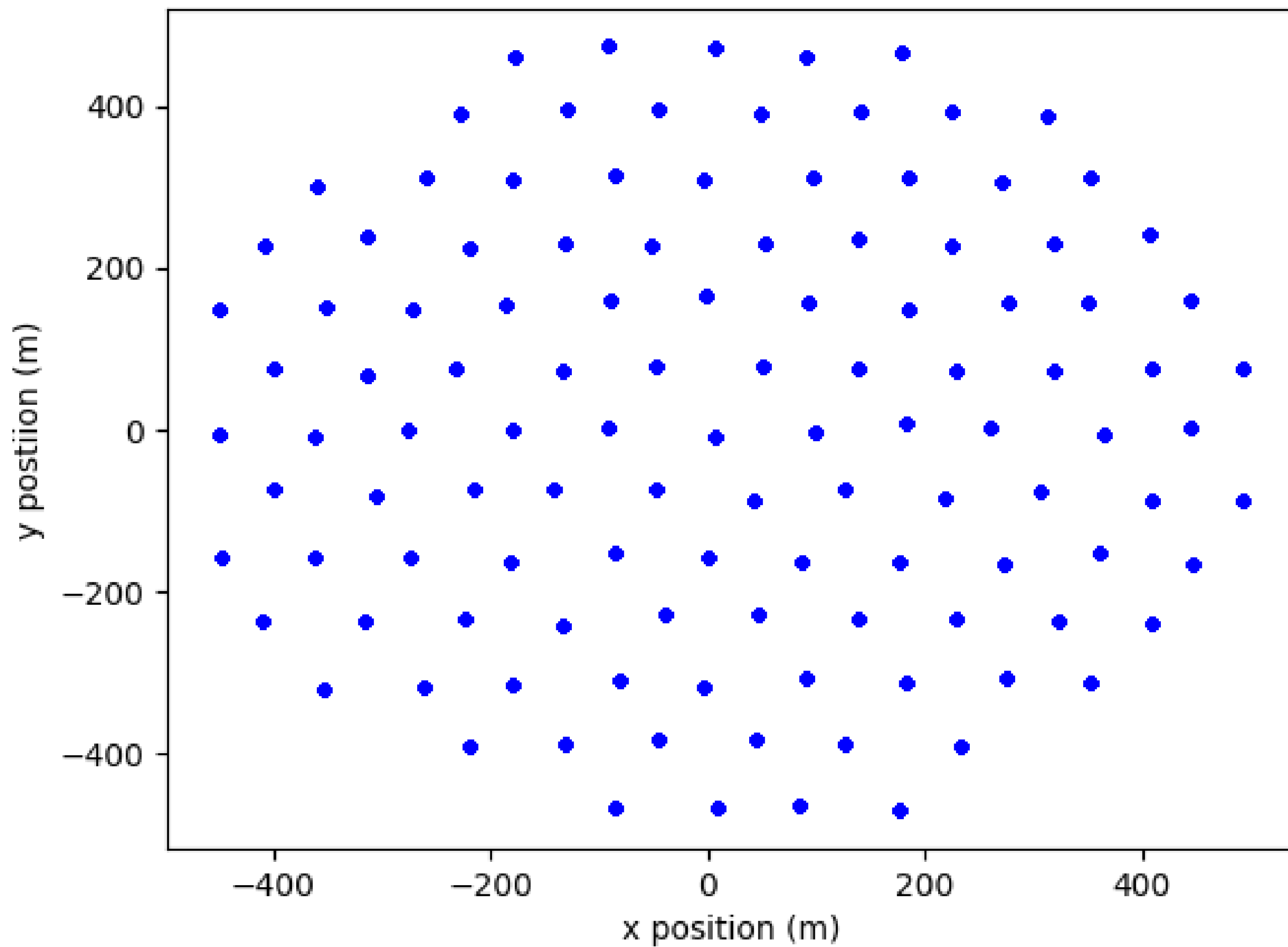


Neural network for Arca

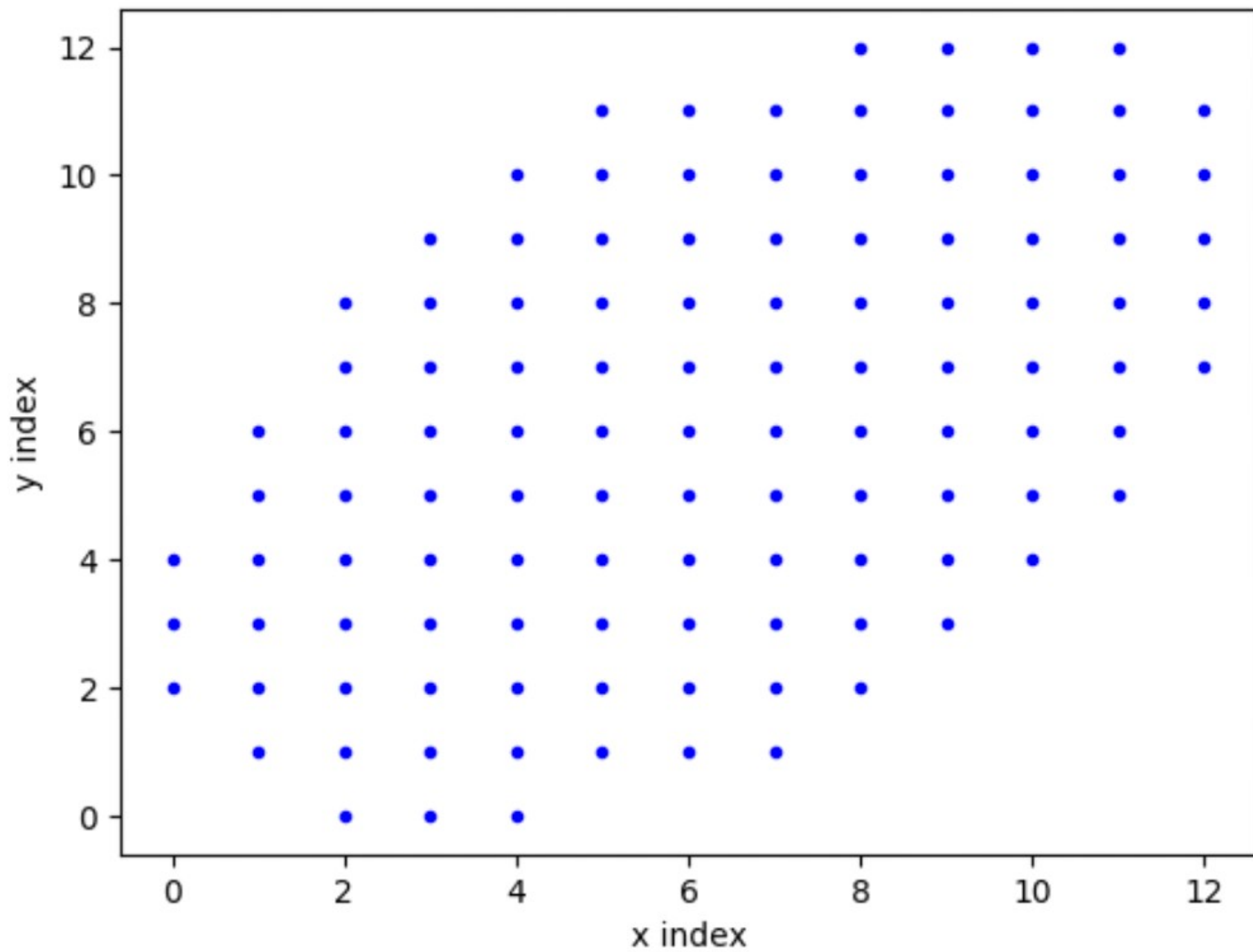
Maarten Post

- Can a neural network distinguish a v_e (CC or NC) event from a v_μ (CC) event?
- How to represent the data?
- What kind of network?

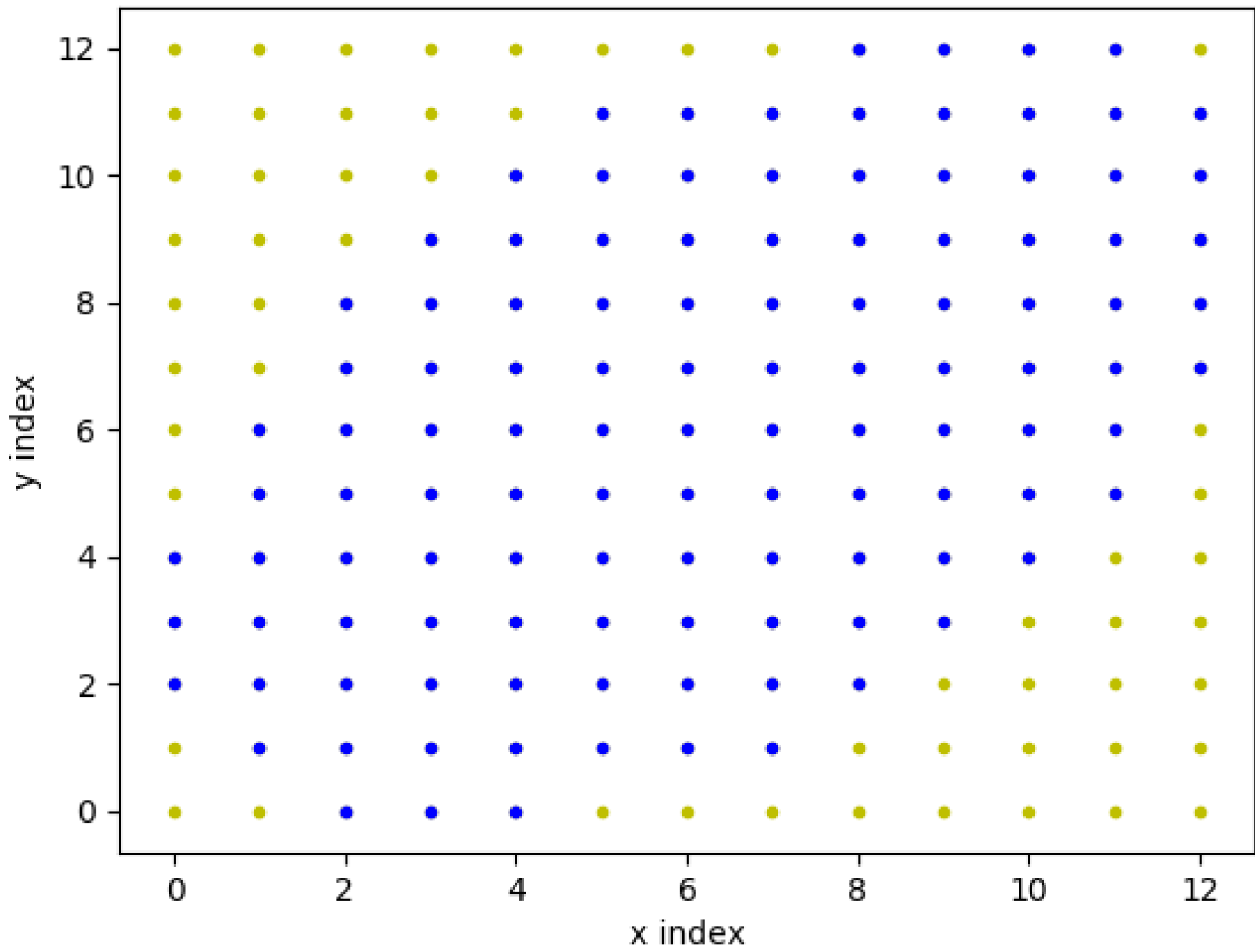
Doms Arca detector from above



Doms Arca detector from above



Doms Arca detector from above

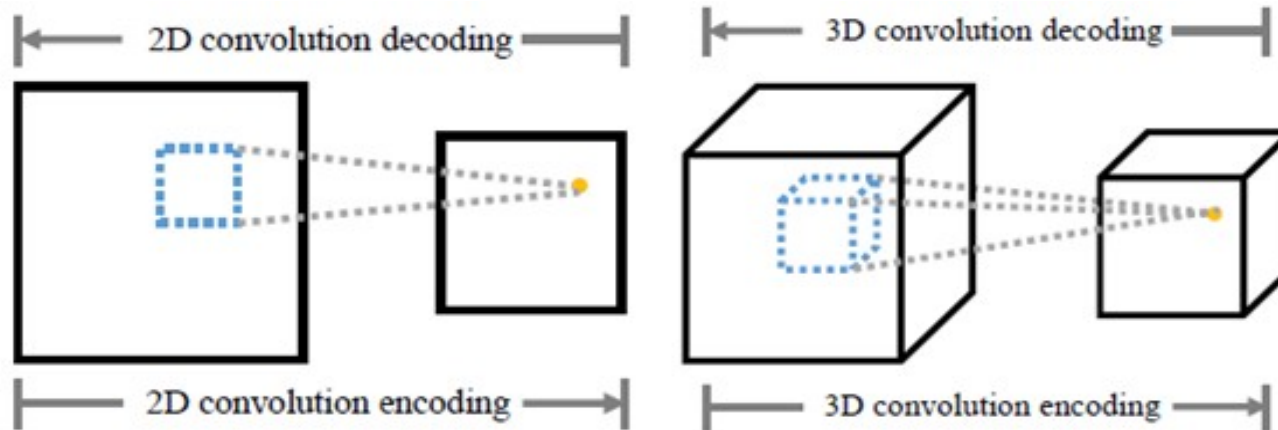


Data

- 13, 13, 18 matrix
- Each element number of hits on that DOM
- Time integrated over event

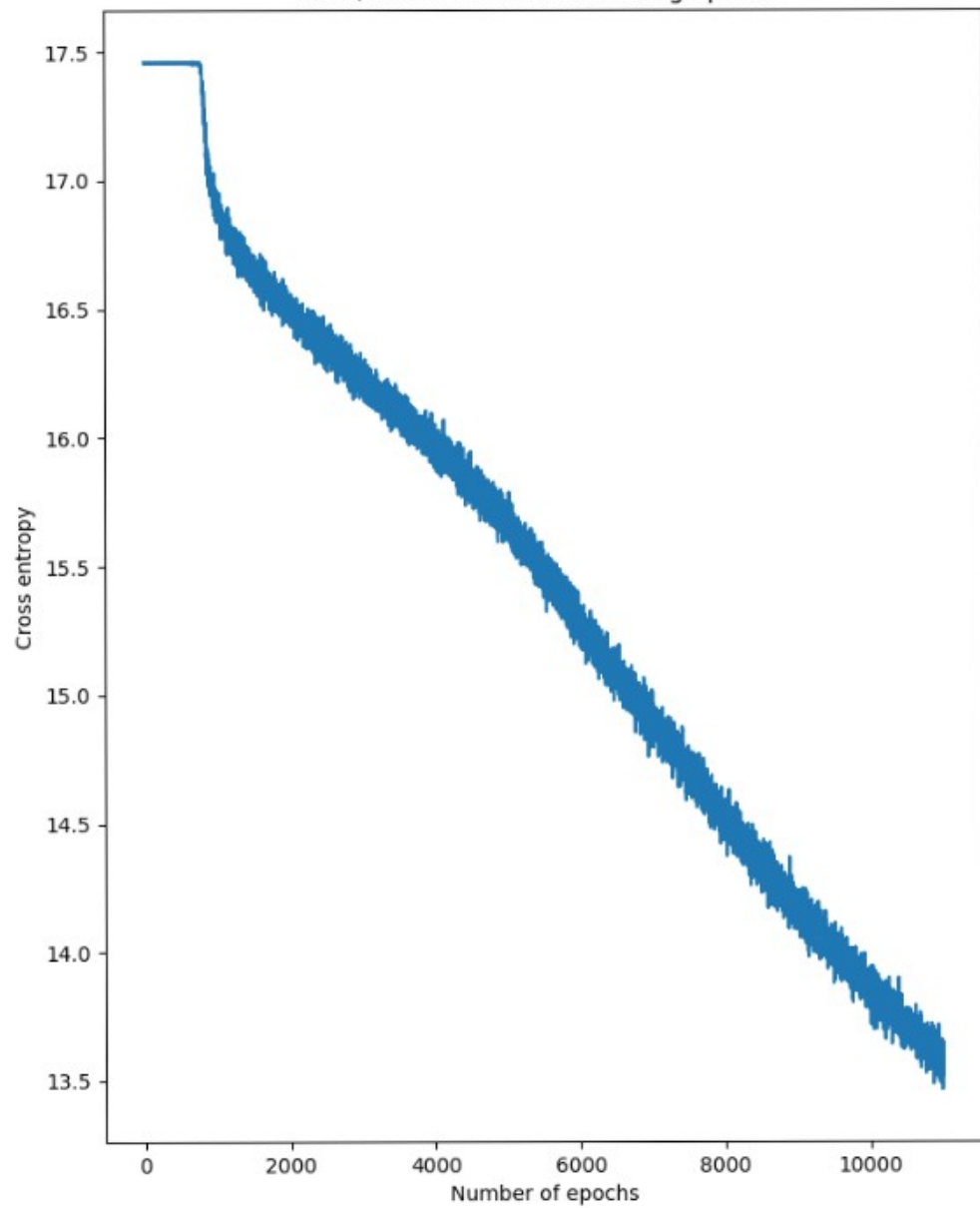
- Training set only mc hits
- One testing set without K40 background
- One testing set with K40 background

Network

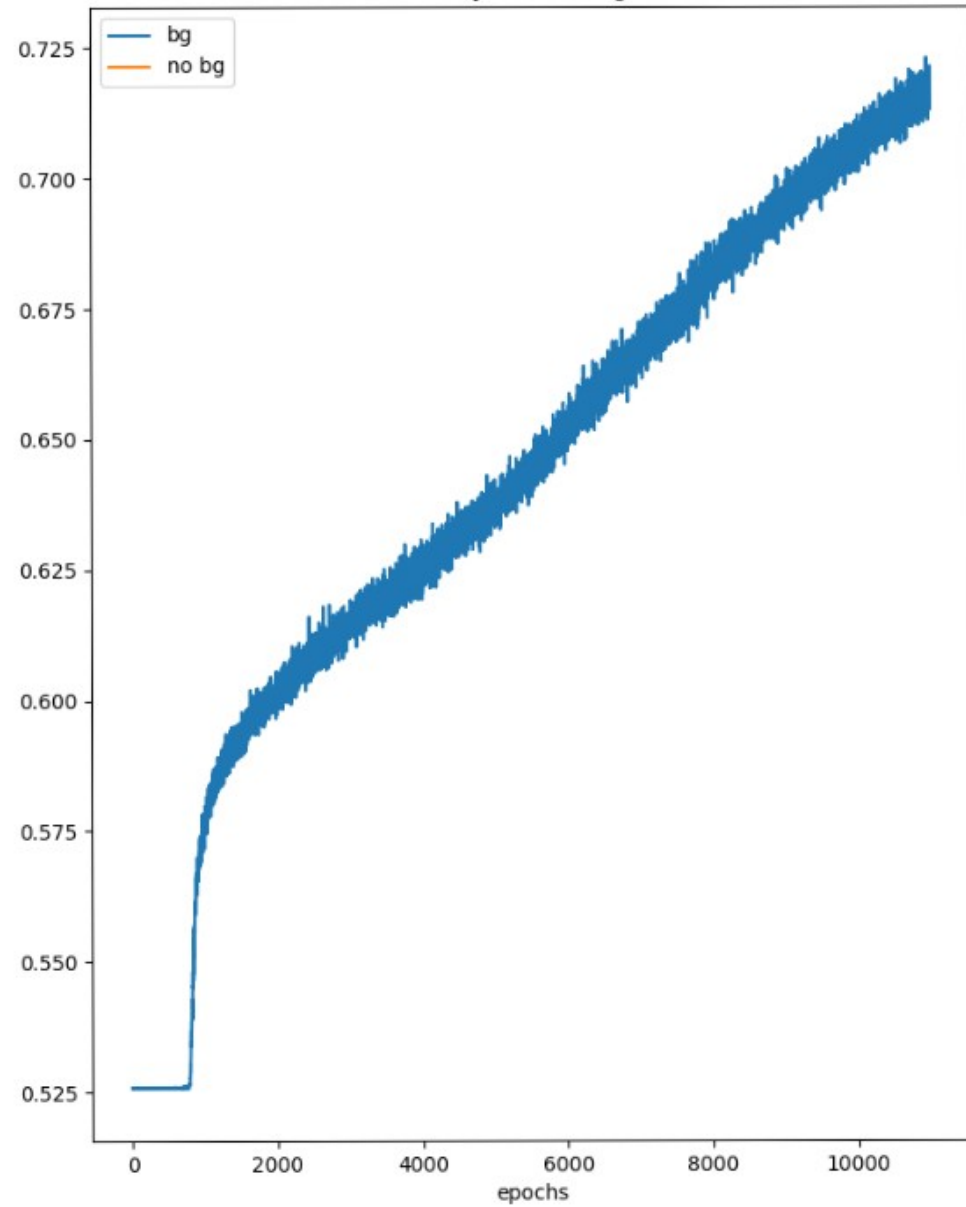


- 3D convolutional
- 2 convolution layers ($6,6,6 * 25$ and $3,3,3 * 16$)
- 1 fully connected layer
- Train 3 days on GPU machine Schol

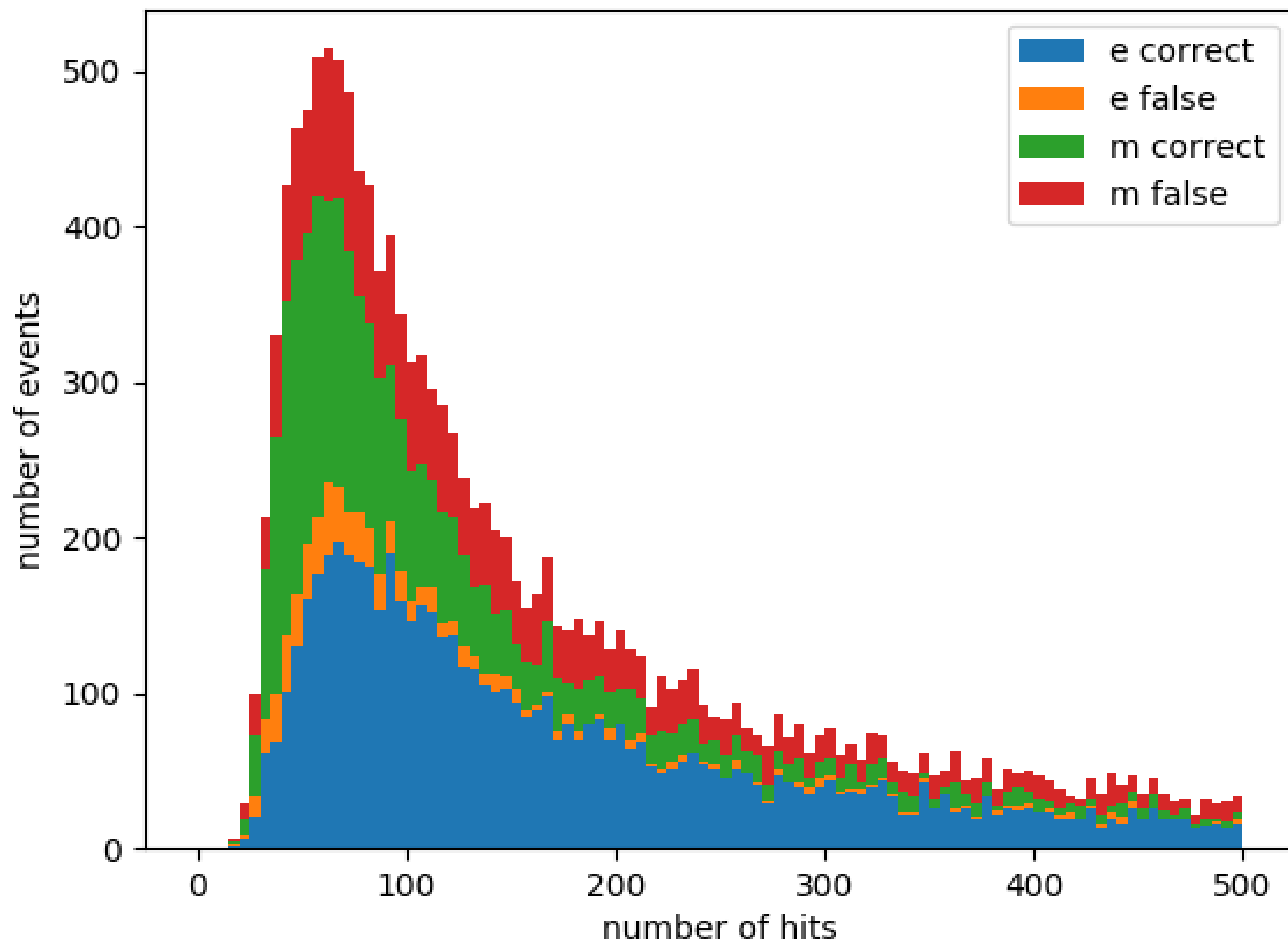
Cost/Loss as fuction of training epochs



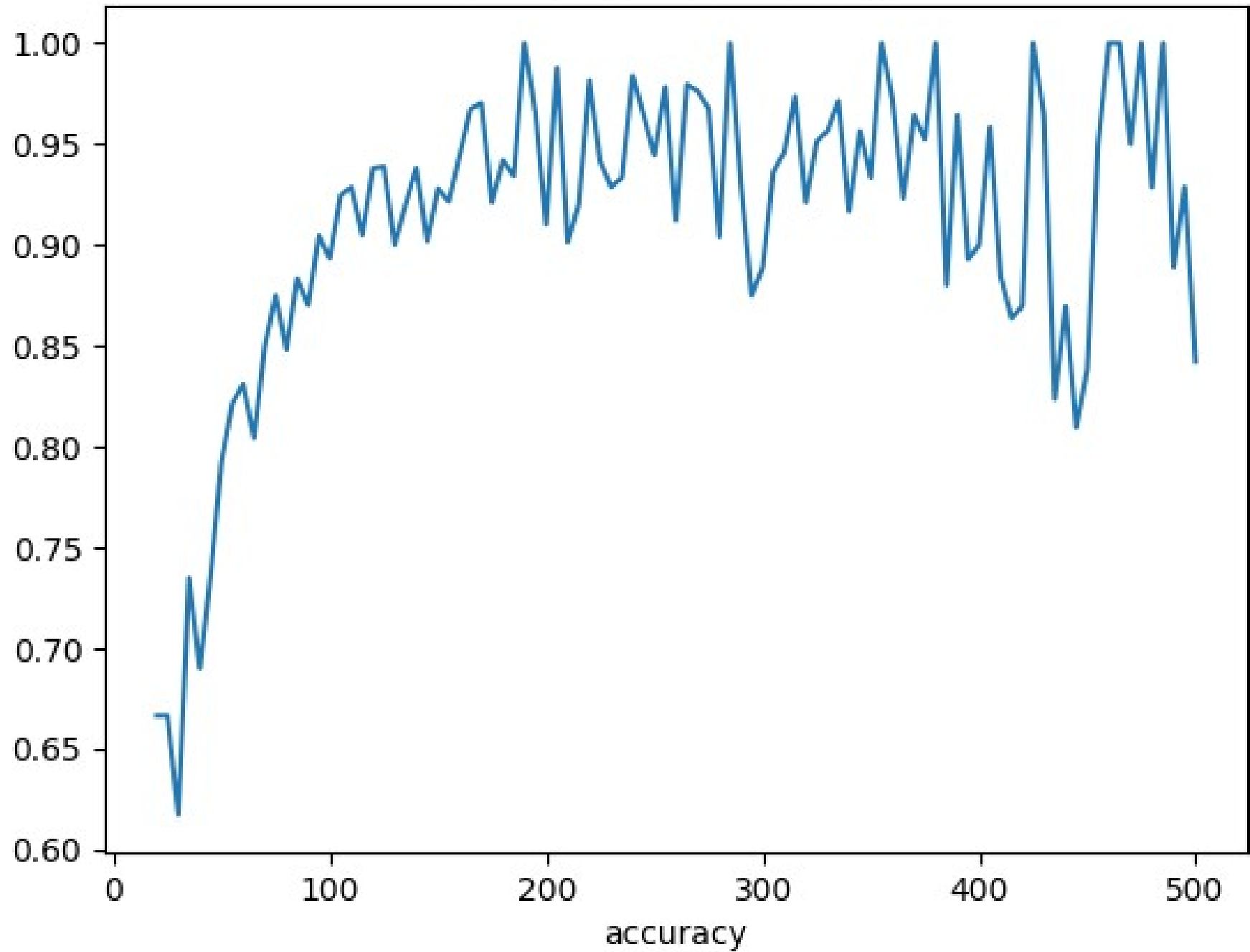
Accuracy on training sets



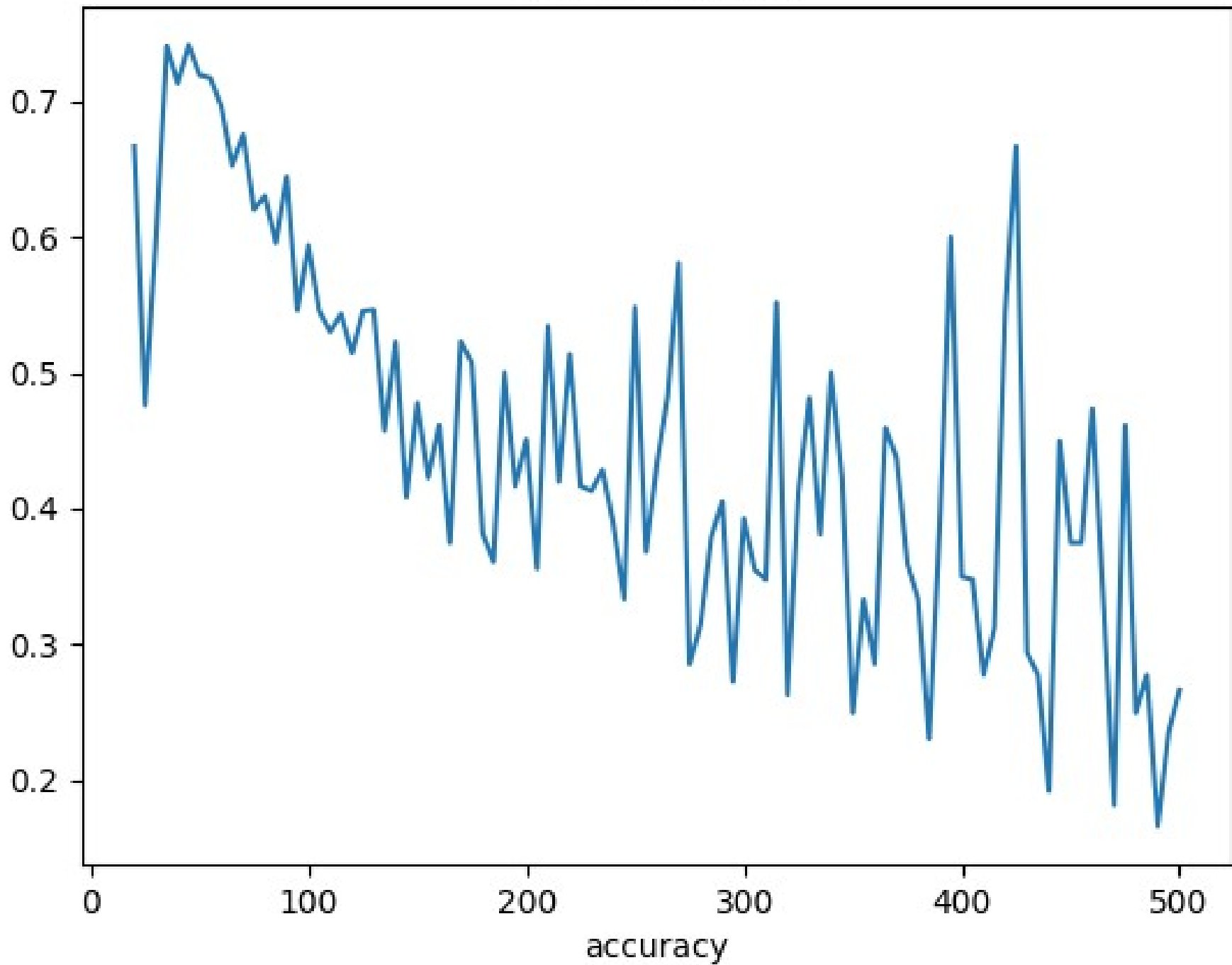
Number of hit distribution (stacked)



eCC and eNC accuracy



muCC accuracy



Next

- Improve network
- Use Tot information
- Use T information

- Classify e , μ , τ , neutrinos
- Classify atmospheric muons and only K40

- More data