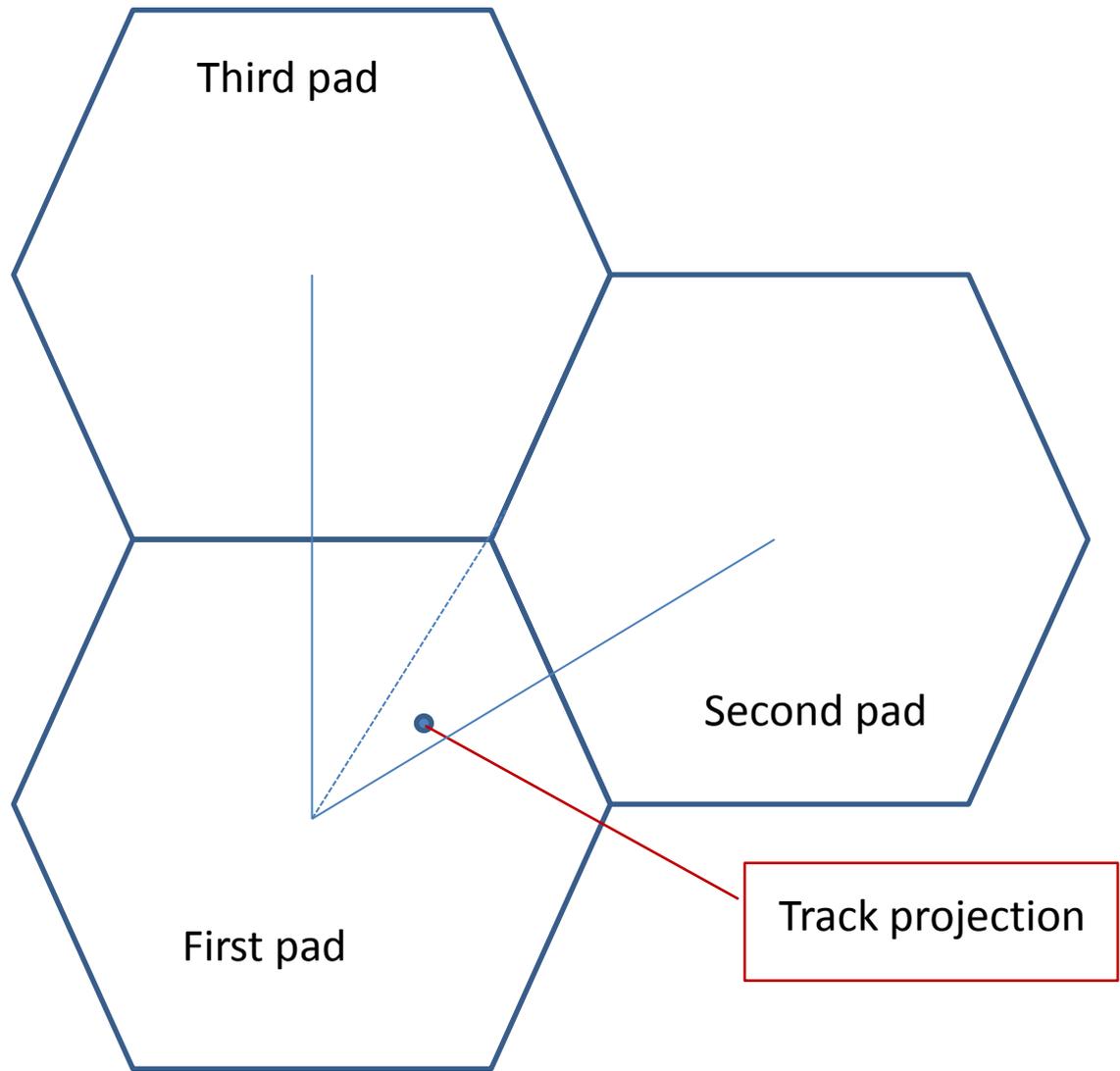


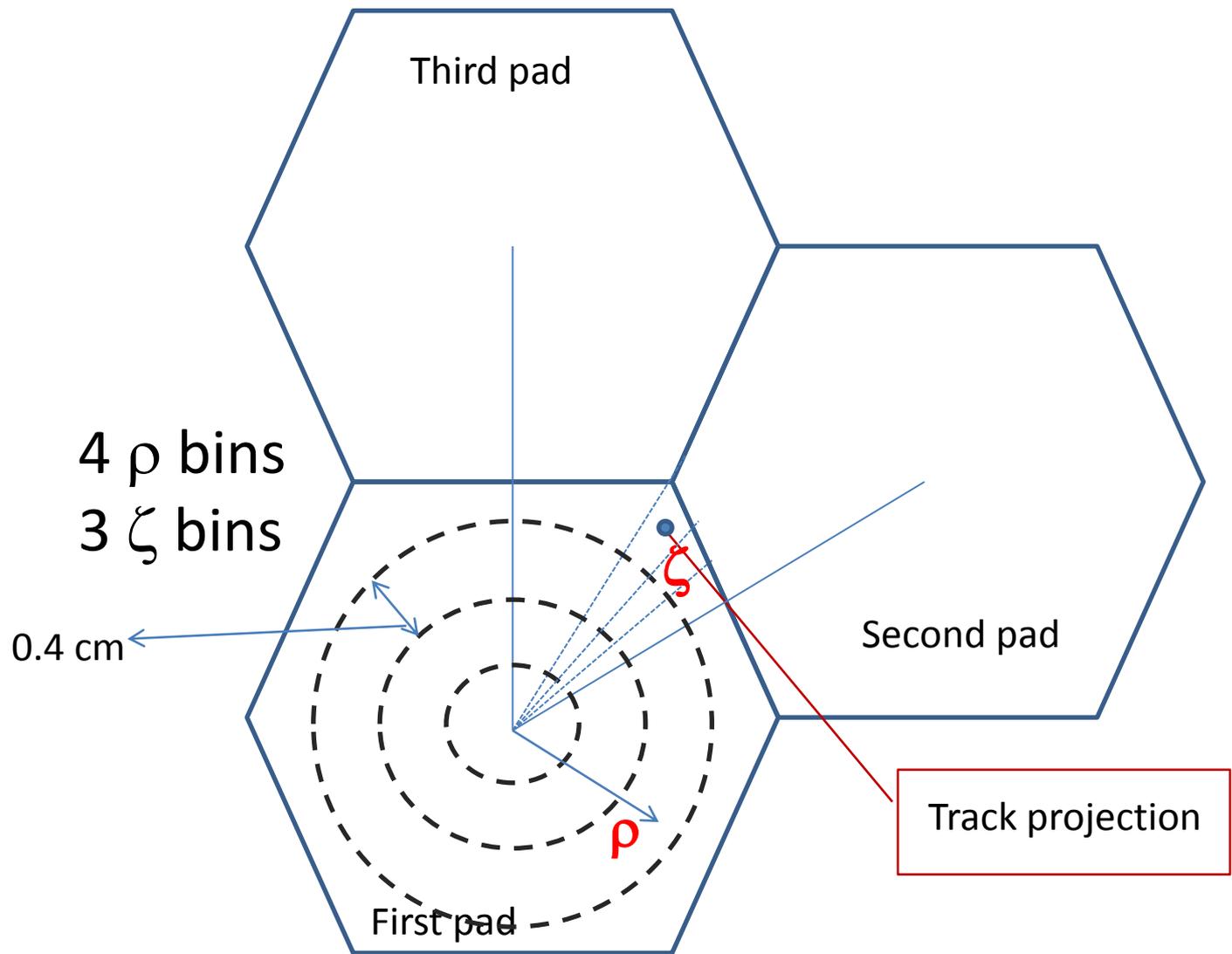
Neural Networks in HBD

Signal/Background separation

2011/3/9

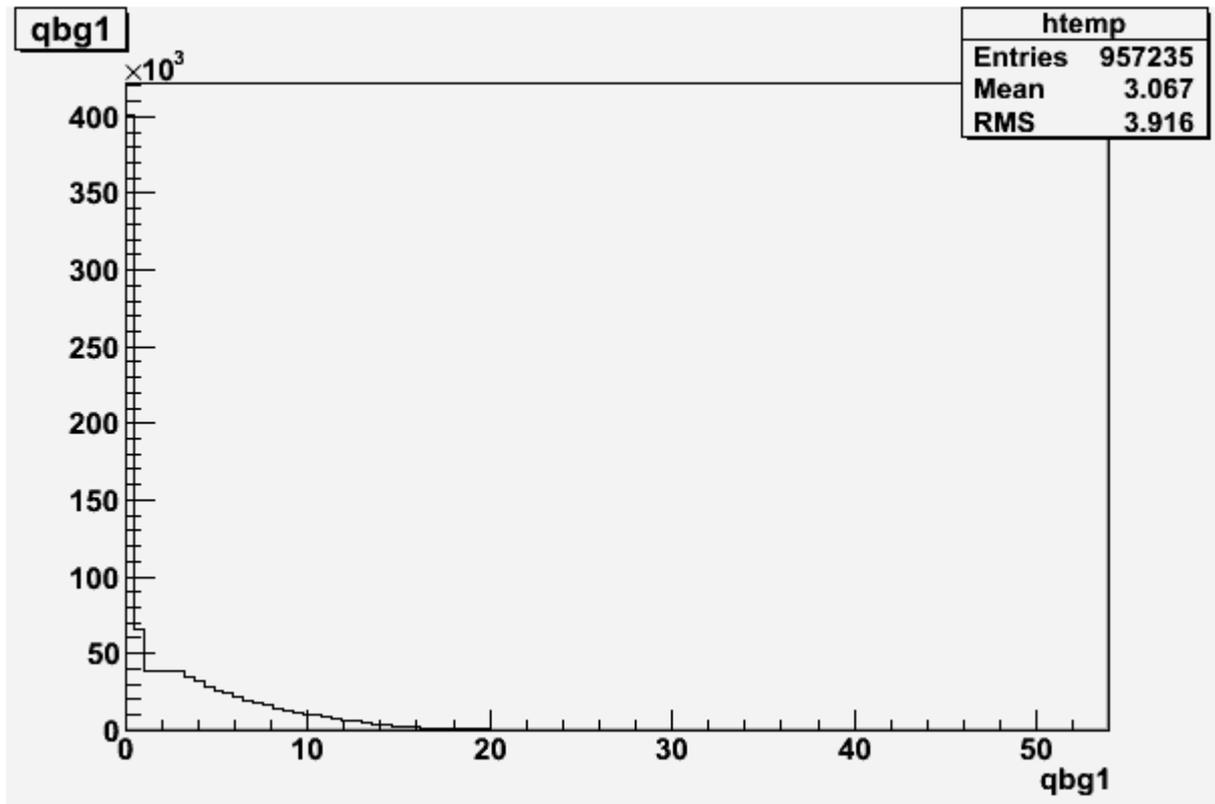
Jiayin Sun





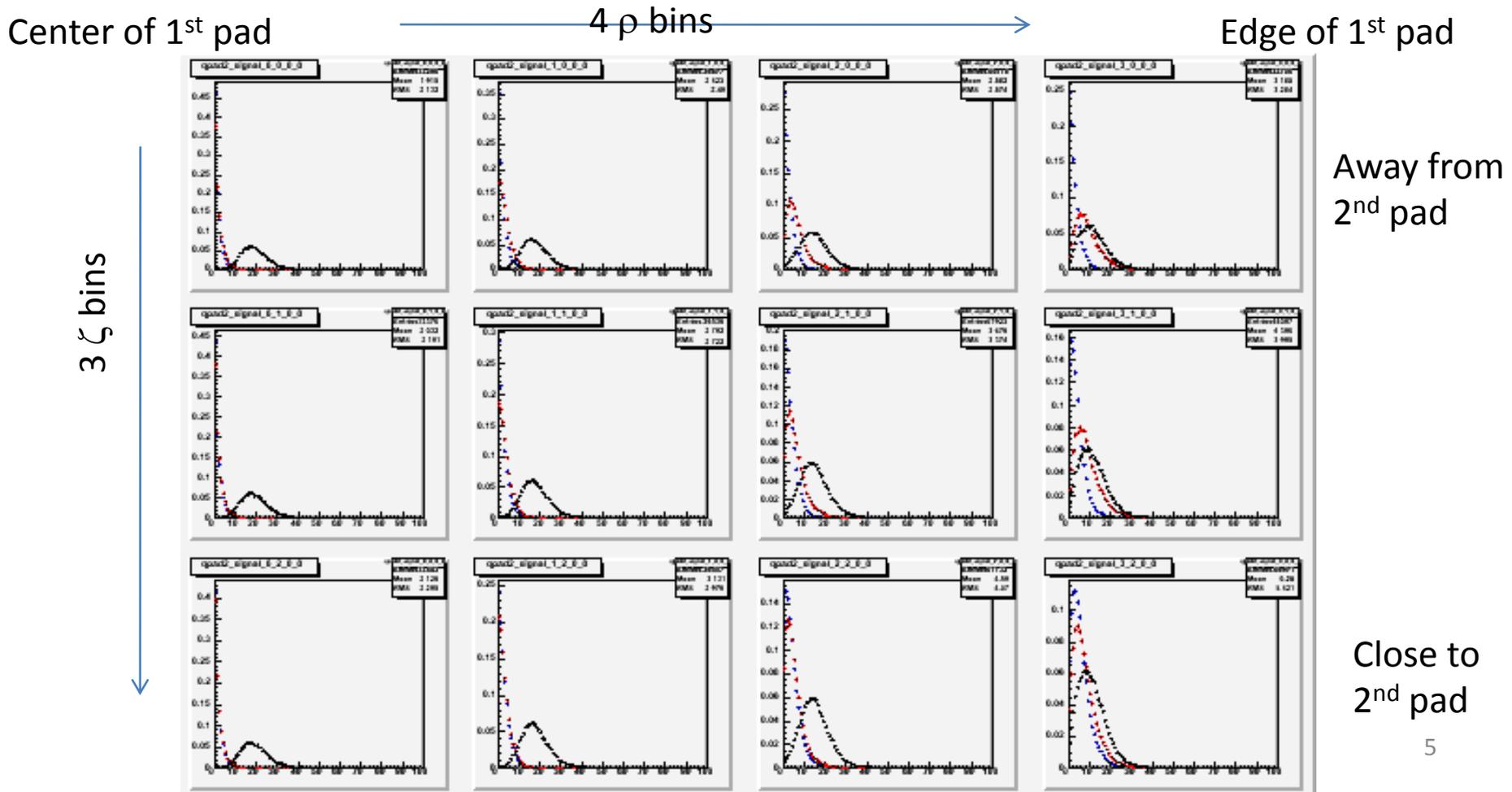
Neighboring pads:
background

1st neighbor background distribution (per pad) 10 background bins



Charge Distribution of 1st 2nd 3rd Pad MC tracks

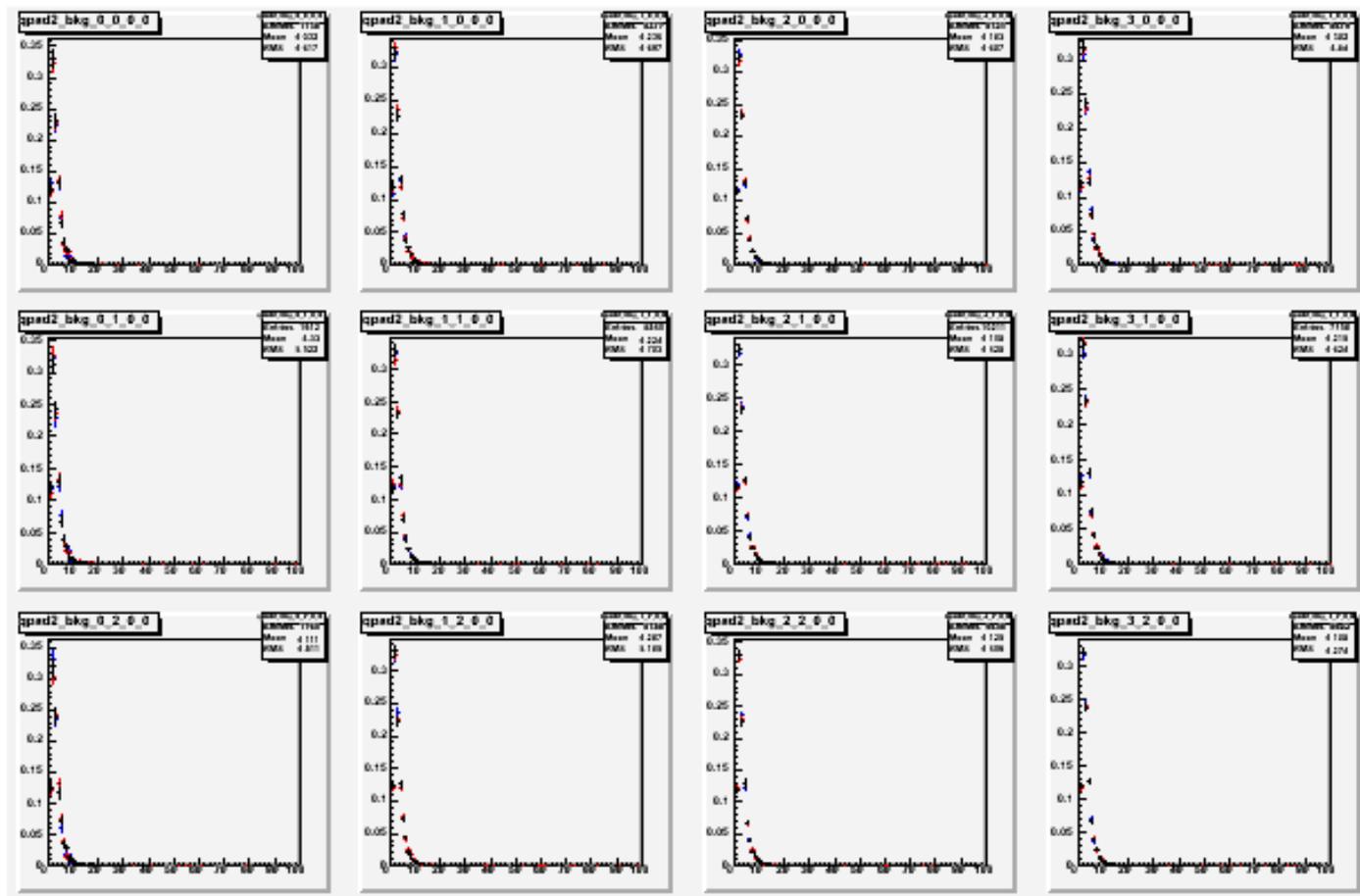
- MC Omega \rightarrow ee



Swapped tracks

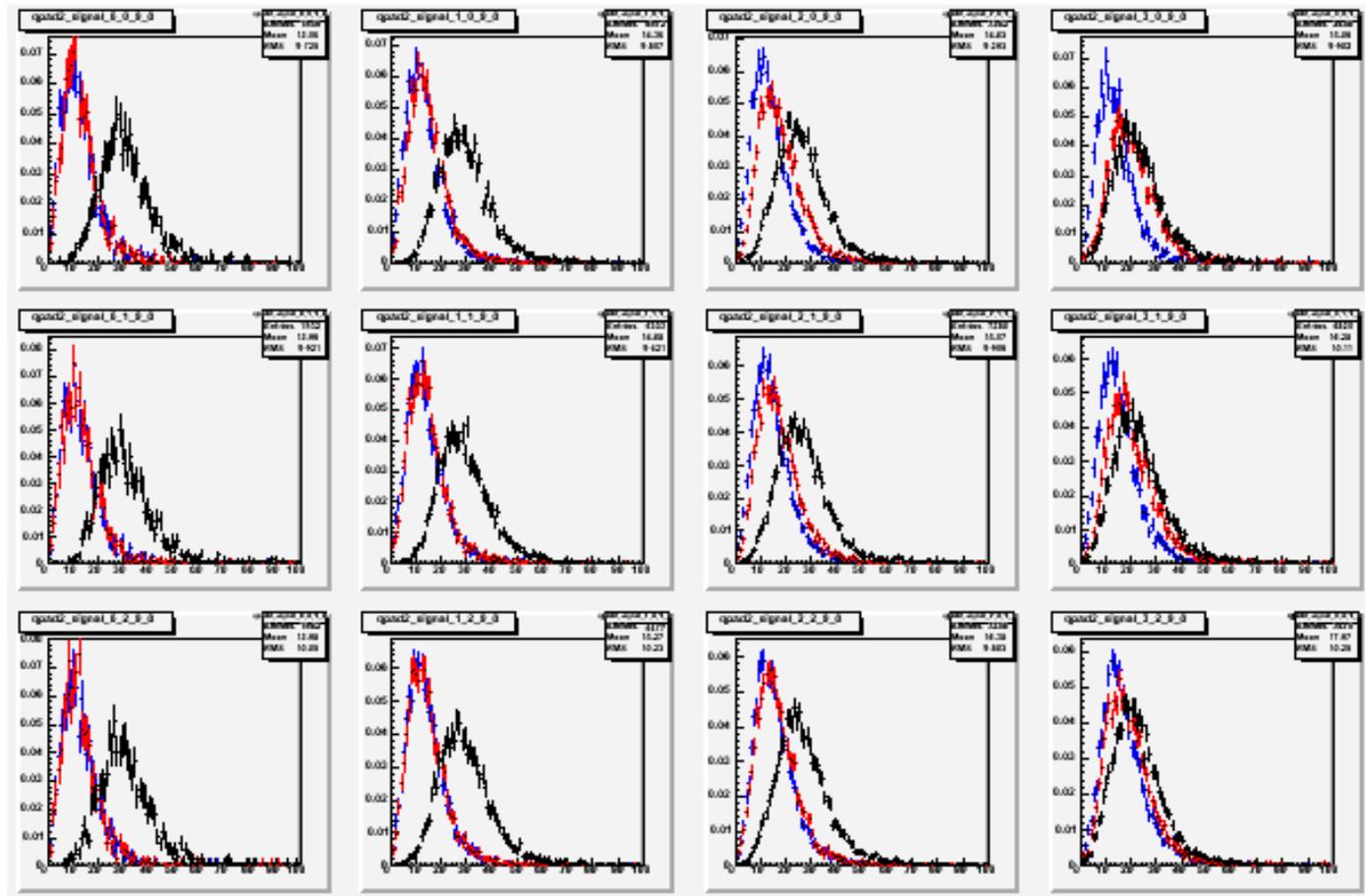
least background

- Swapped tracks. (Embed Omega \rightarrow ee)
- At 1st neighbor background < 1



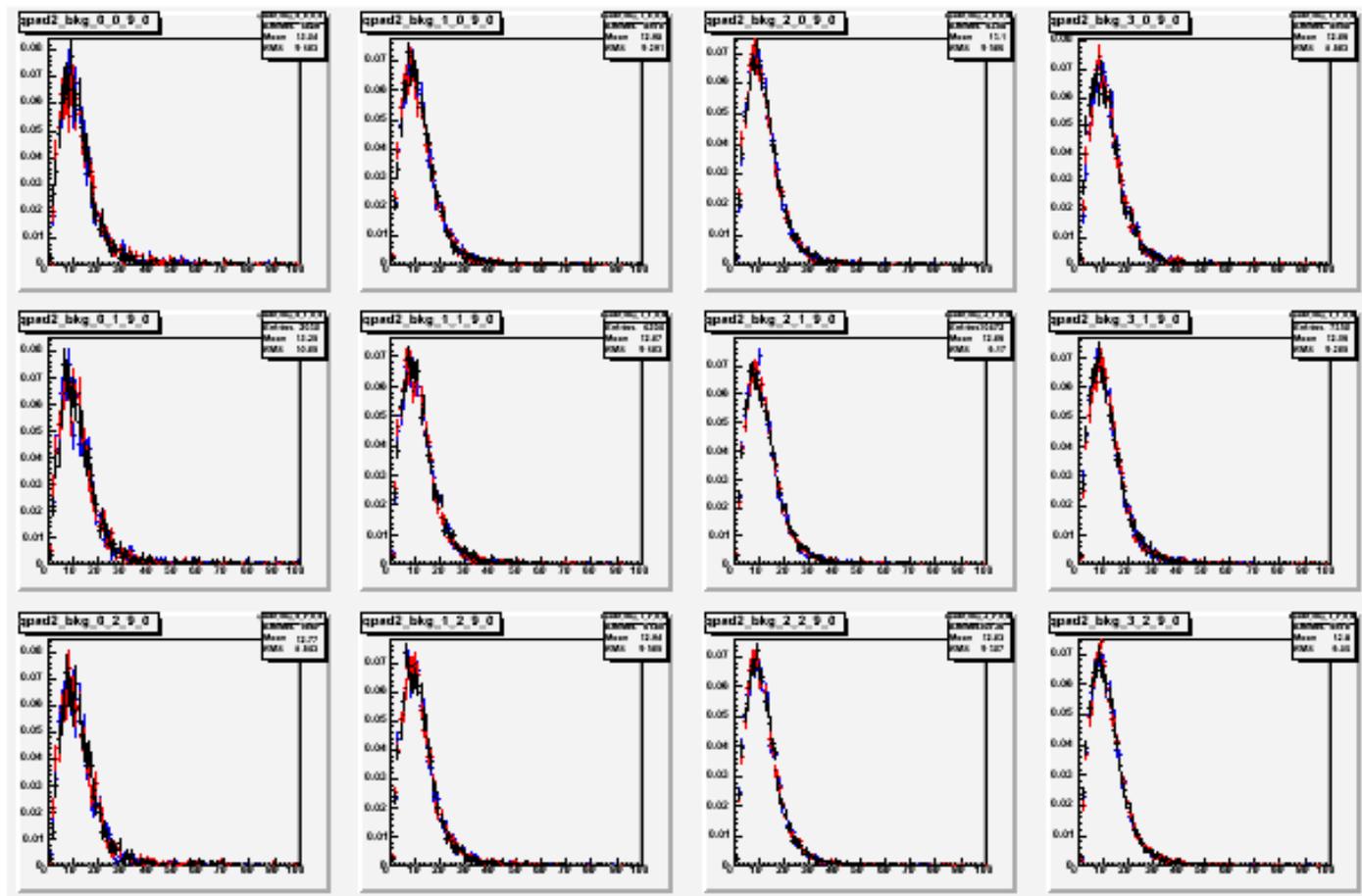
Embedded tracks high background

- Embed Omega \rightarrow ee
- At 1st neighbor background >9



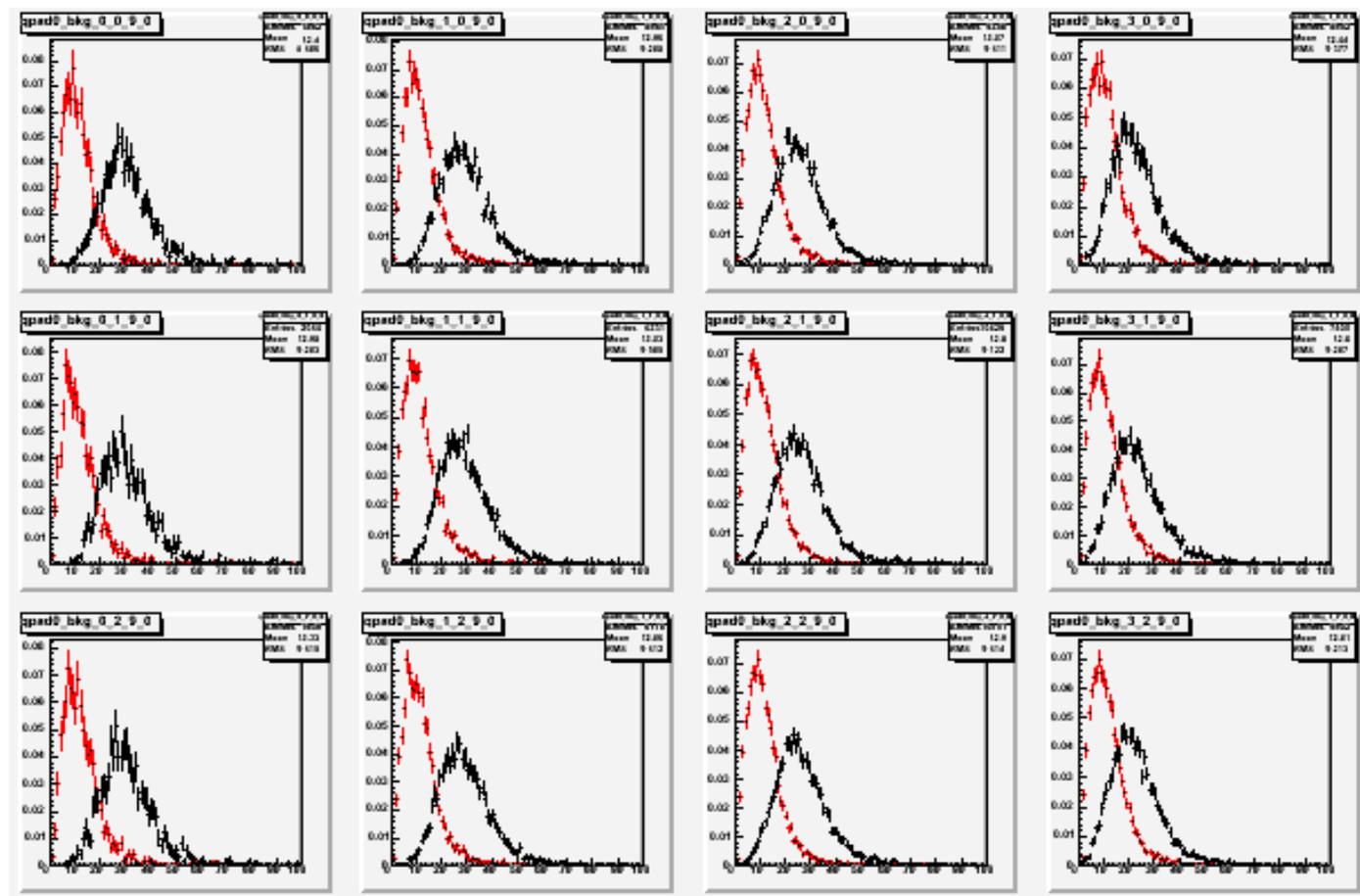
Swapped tracks high background

- Swapped tracks. (Embed Omega \rightarrow ee)
- At 1st neighbor background >9



Embedded vs. **Swapped** tracks high background

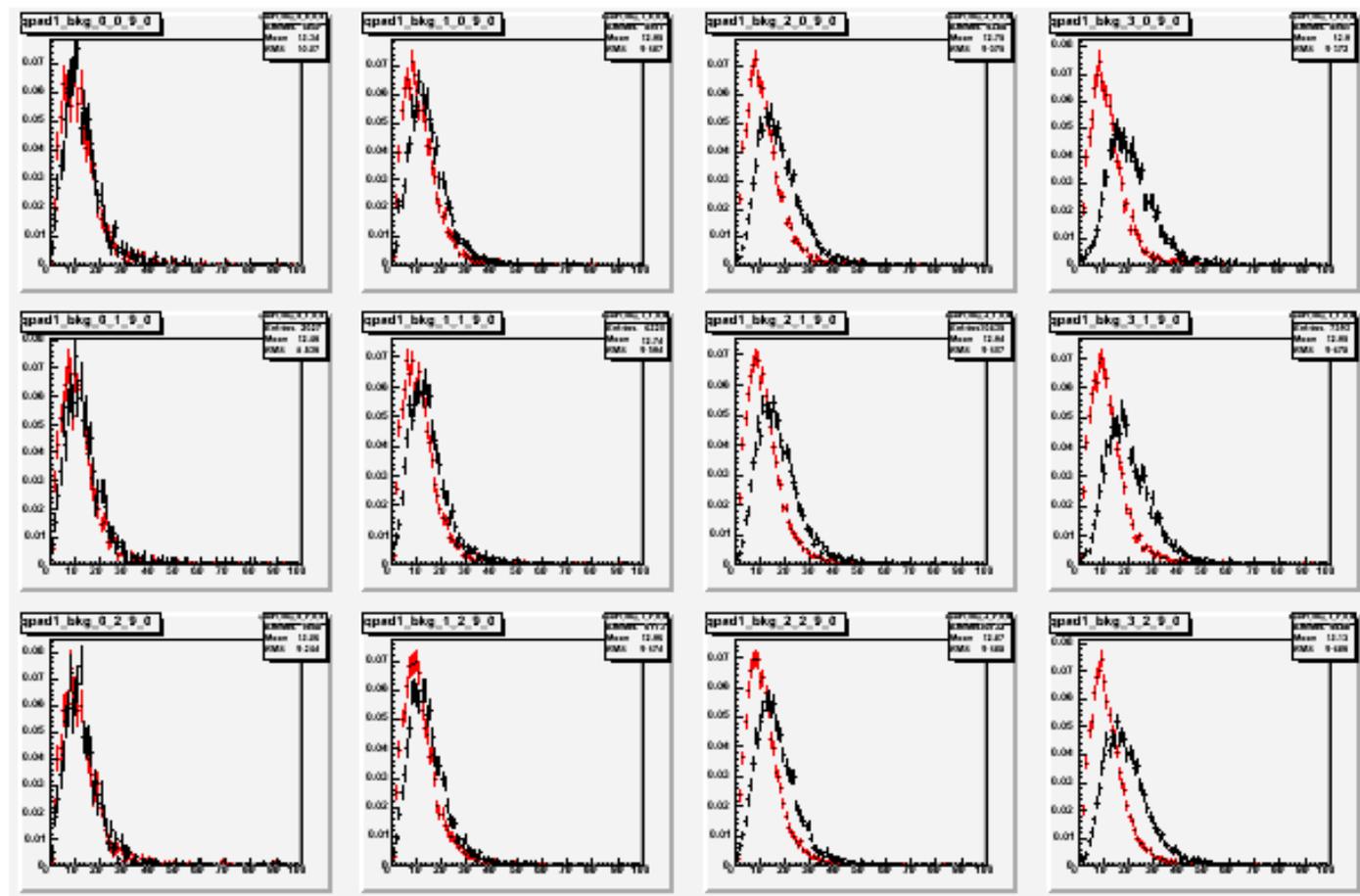
- At 1st neighbor background >9
- 1st pad distribution



Embedded vs. **Swapped** tracks

high background

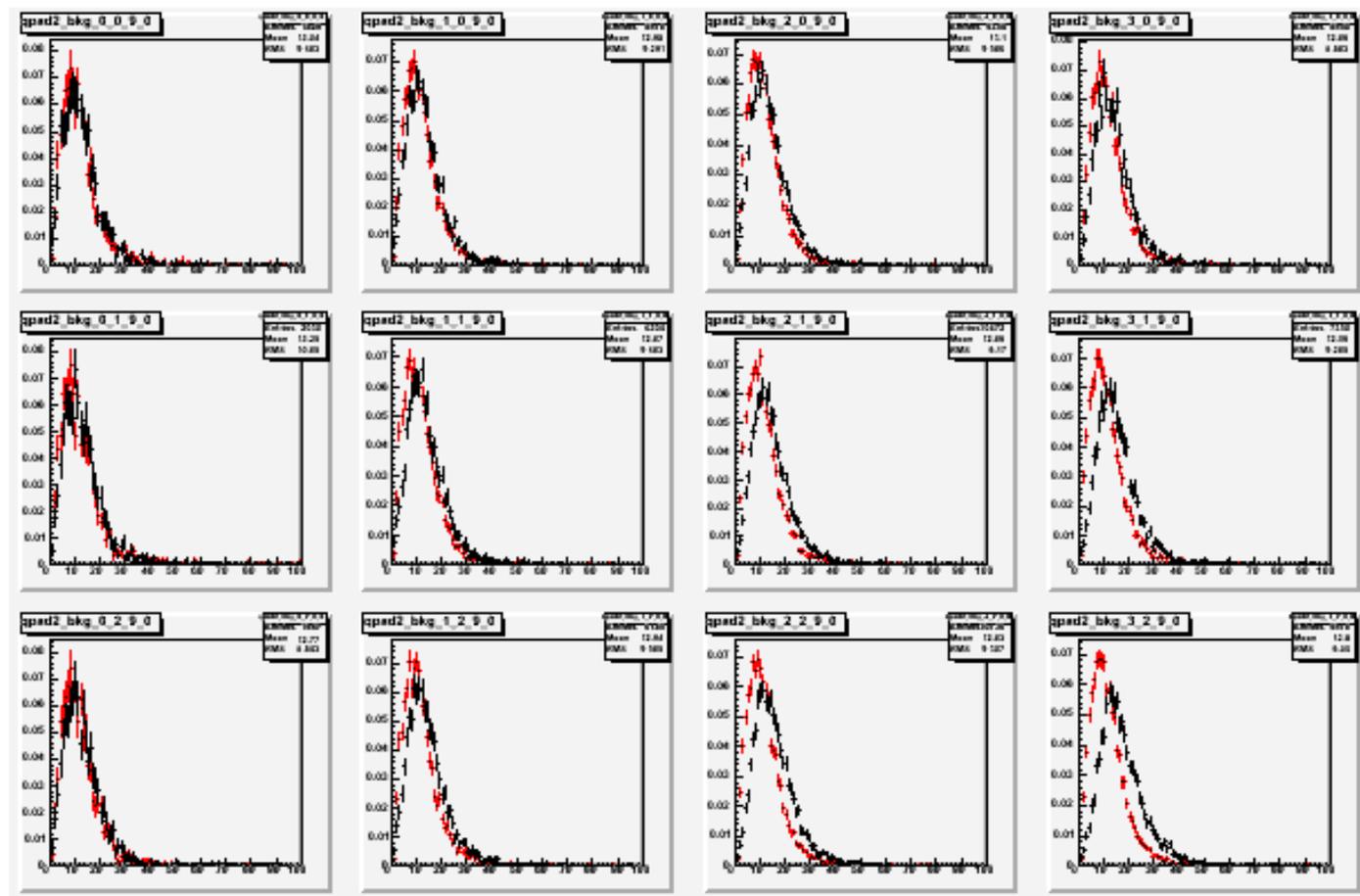
- At 1st neighbor background >9
- 2nd pad distribution

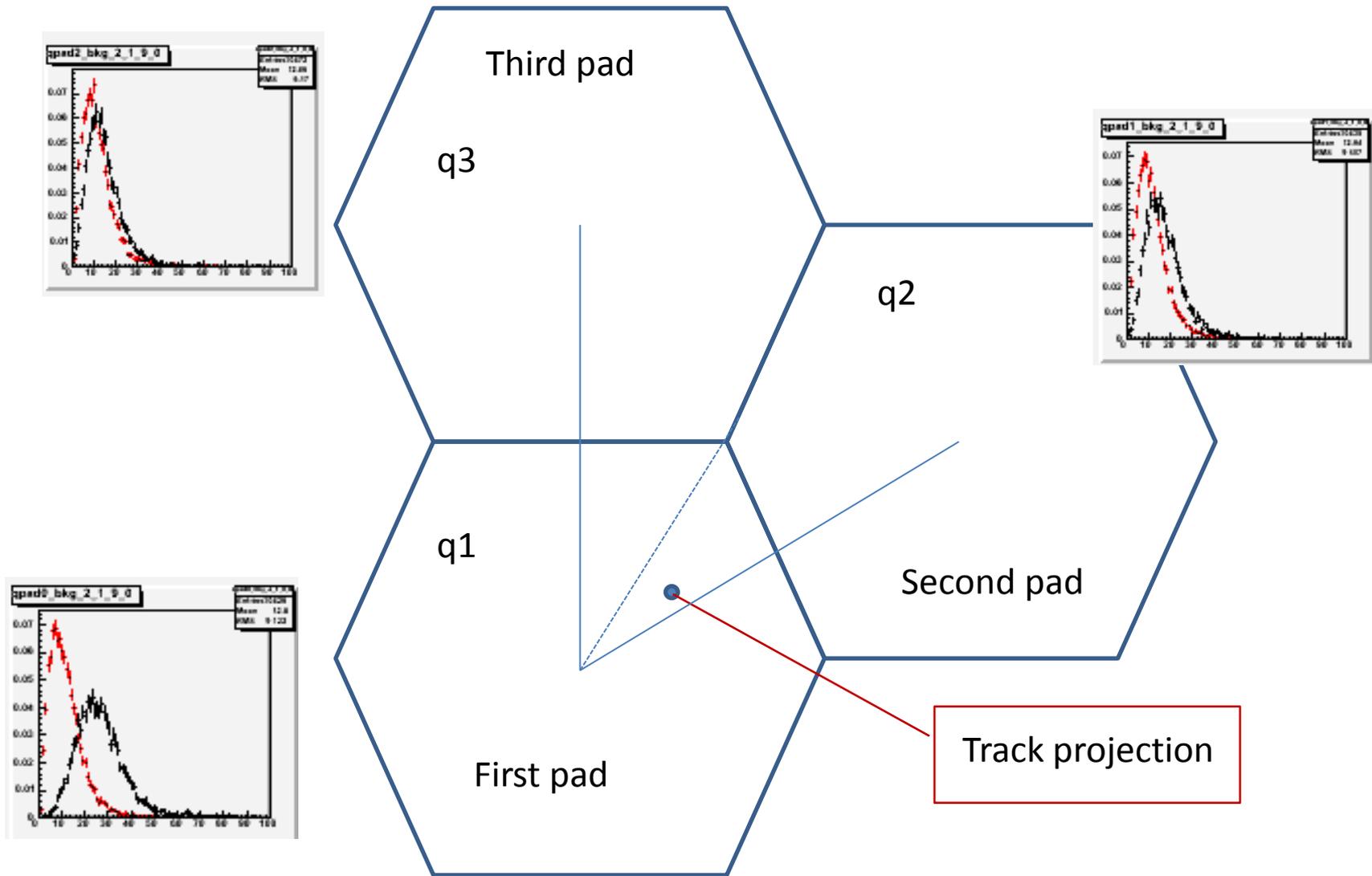


Embedded vs. **Swapped** tracks

high background

- At 1st neighbor background >9
- 3rd pad distribution

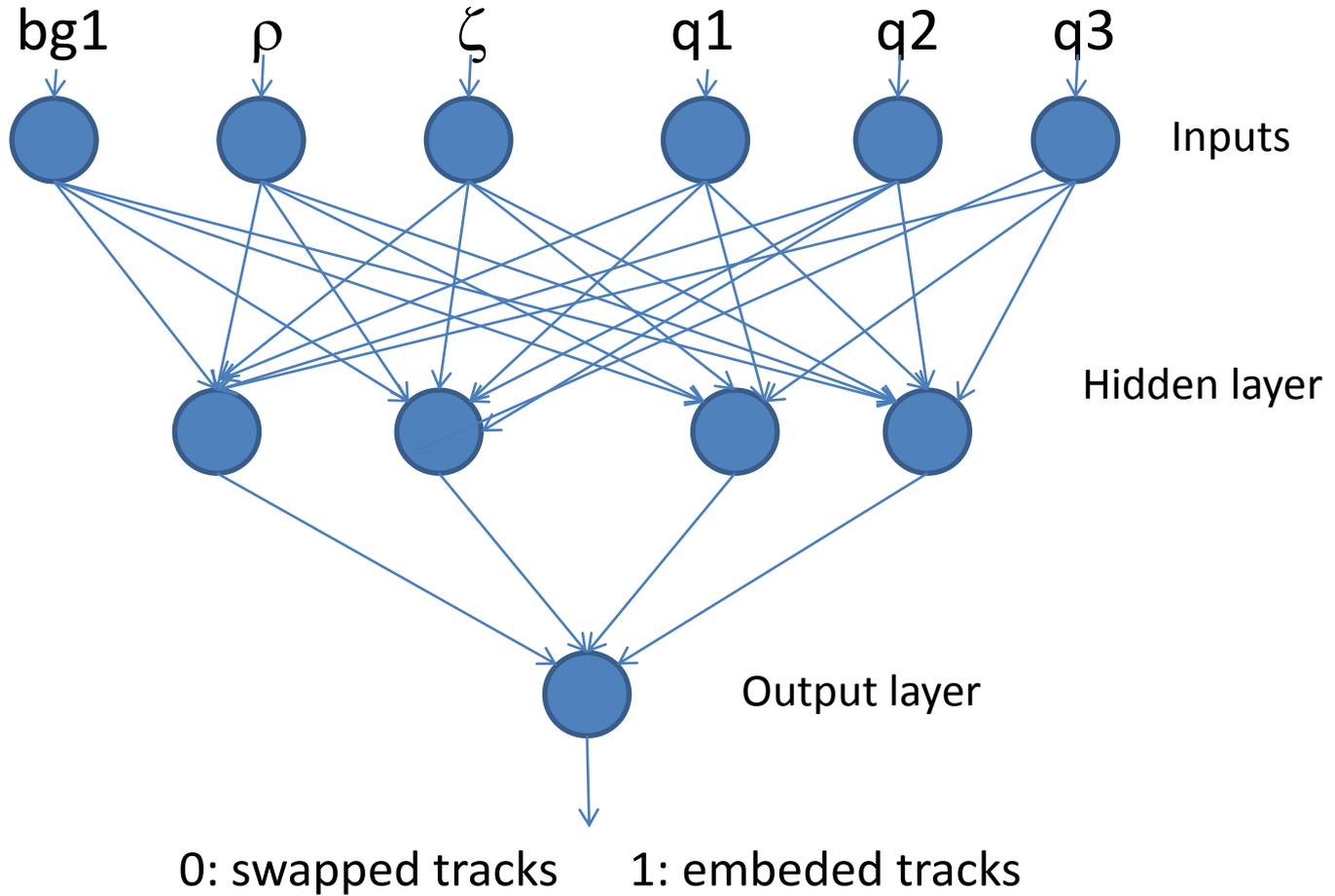




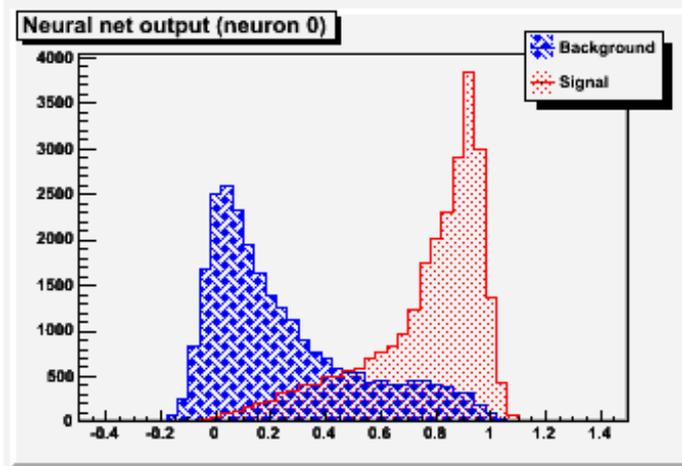
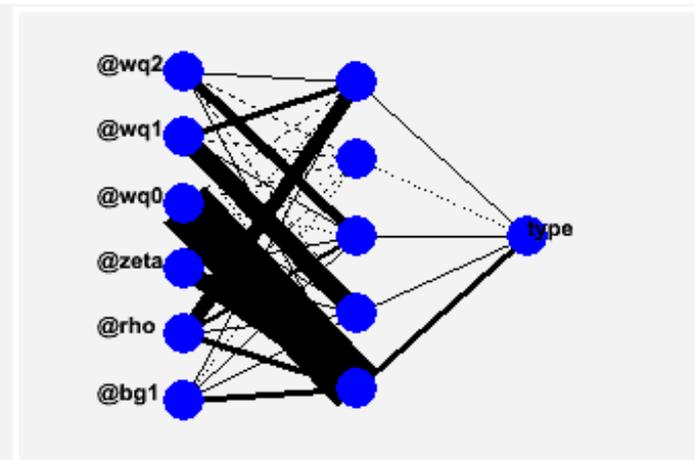
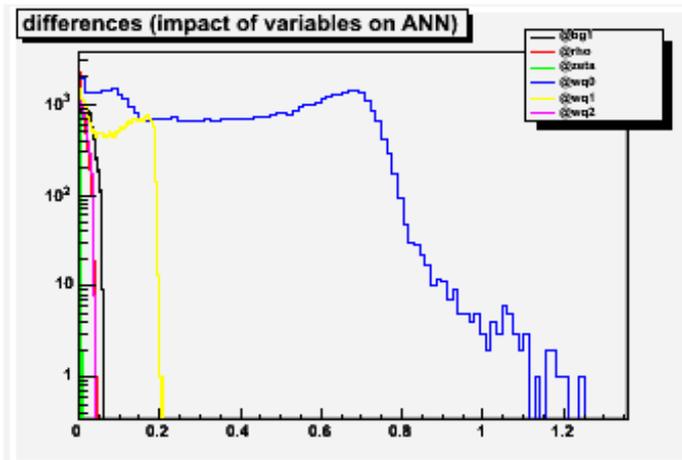
A track @ (ρ, ζ) ,
 leaving charge **q1**, **q2**, **q3** at the 3 pads, with neighbor background **qbg**

Using neural networks

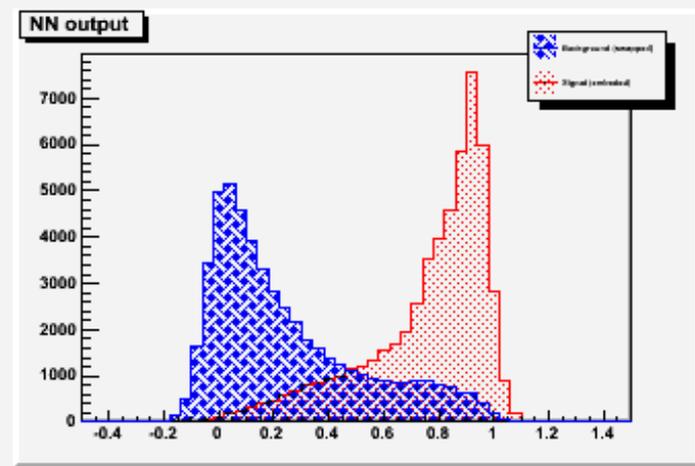
Neural networks



NN result: 10% most central AuAu@200 GeV

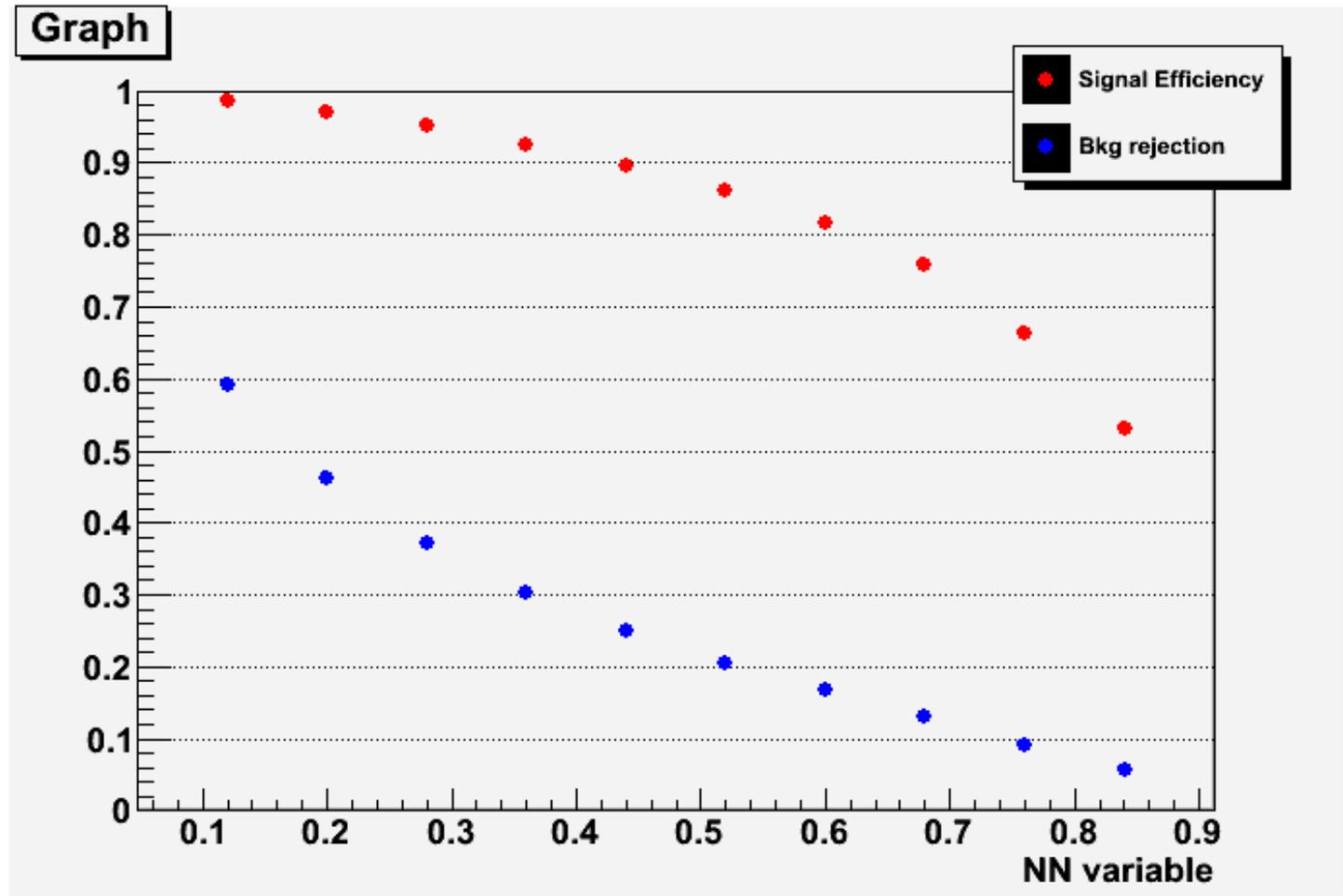


Testing samples

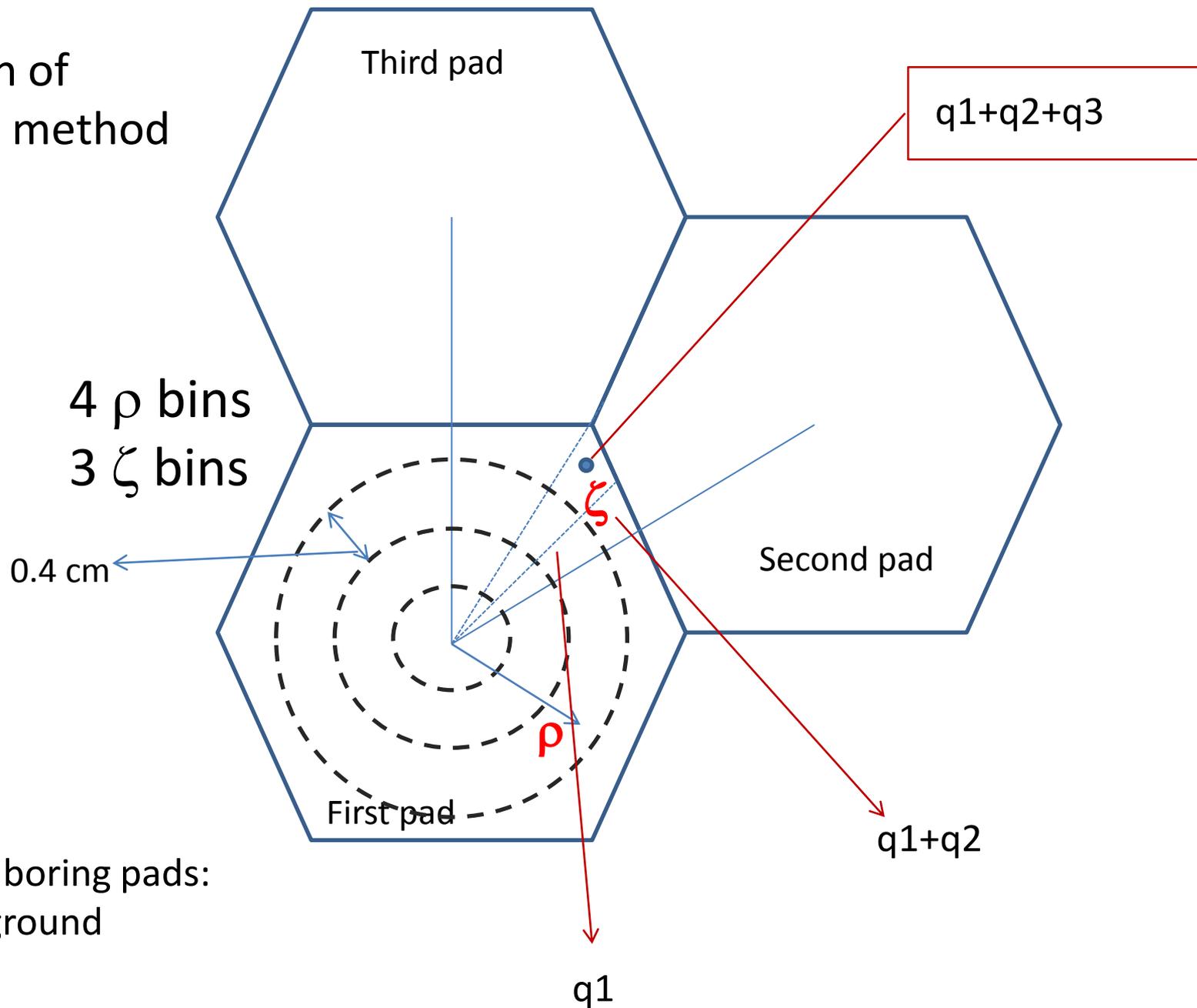


All samples

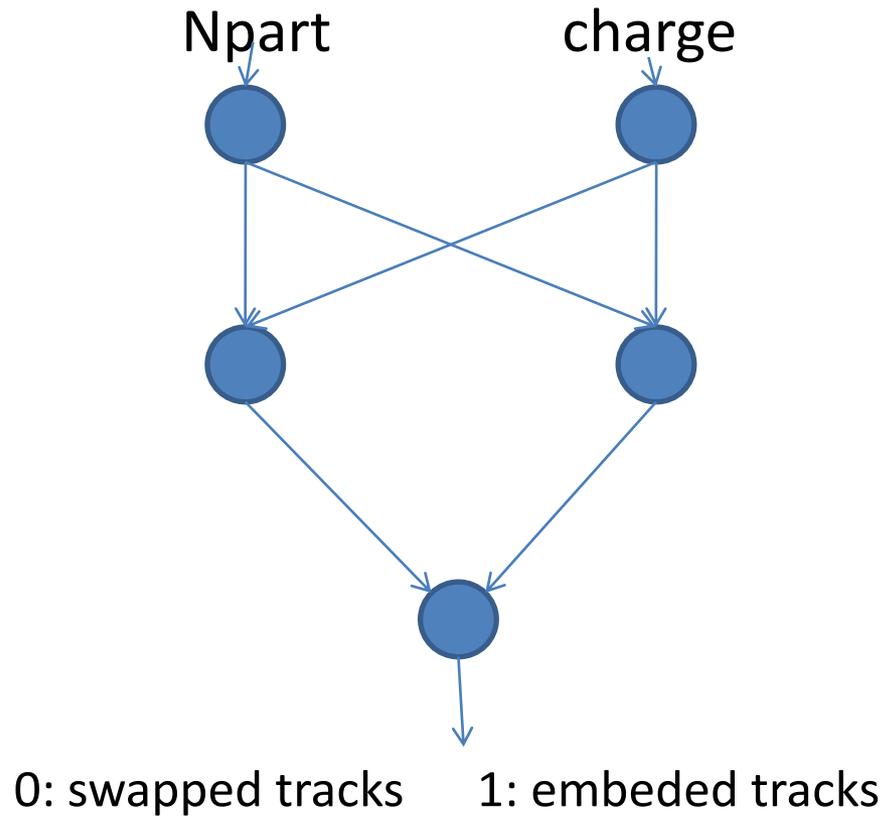
Efficiency and Rejection



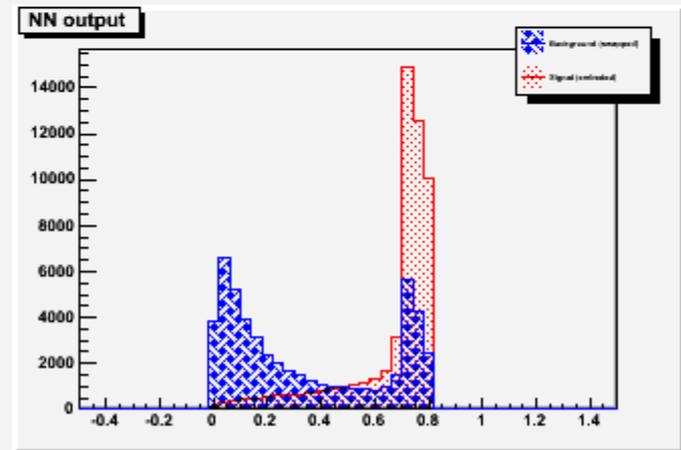
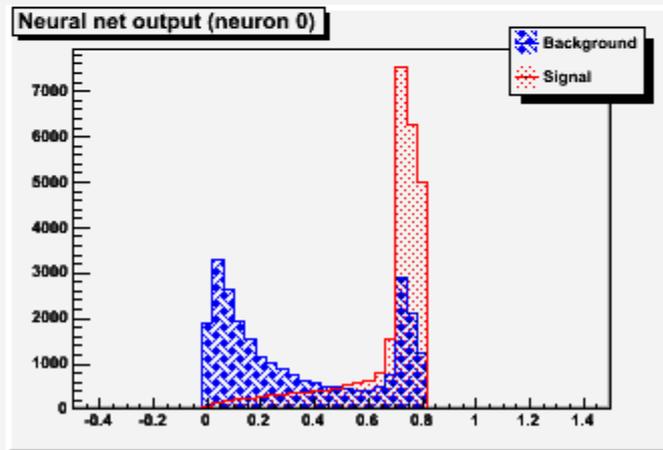
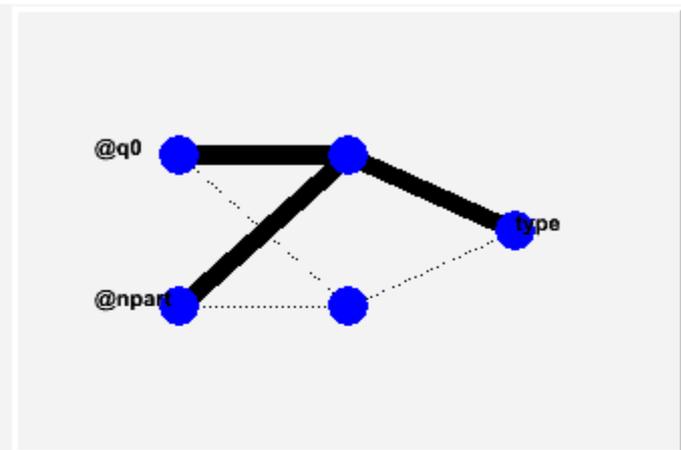
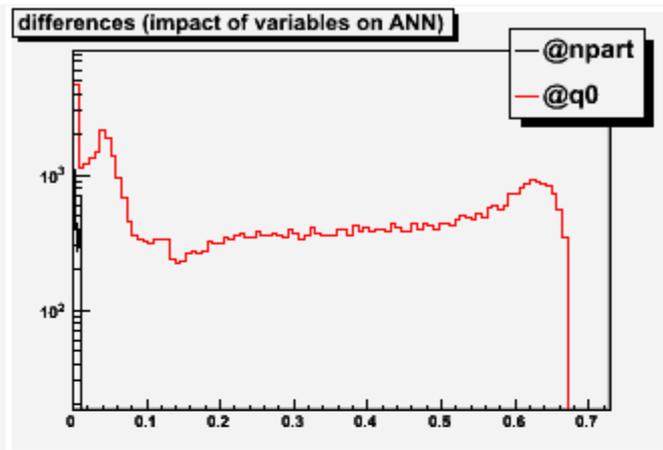
Imitation of Yosuke's method



Imitation of Yosuke's method



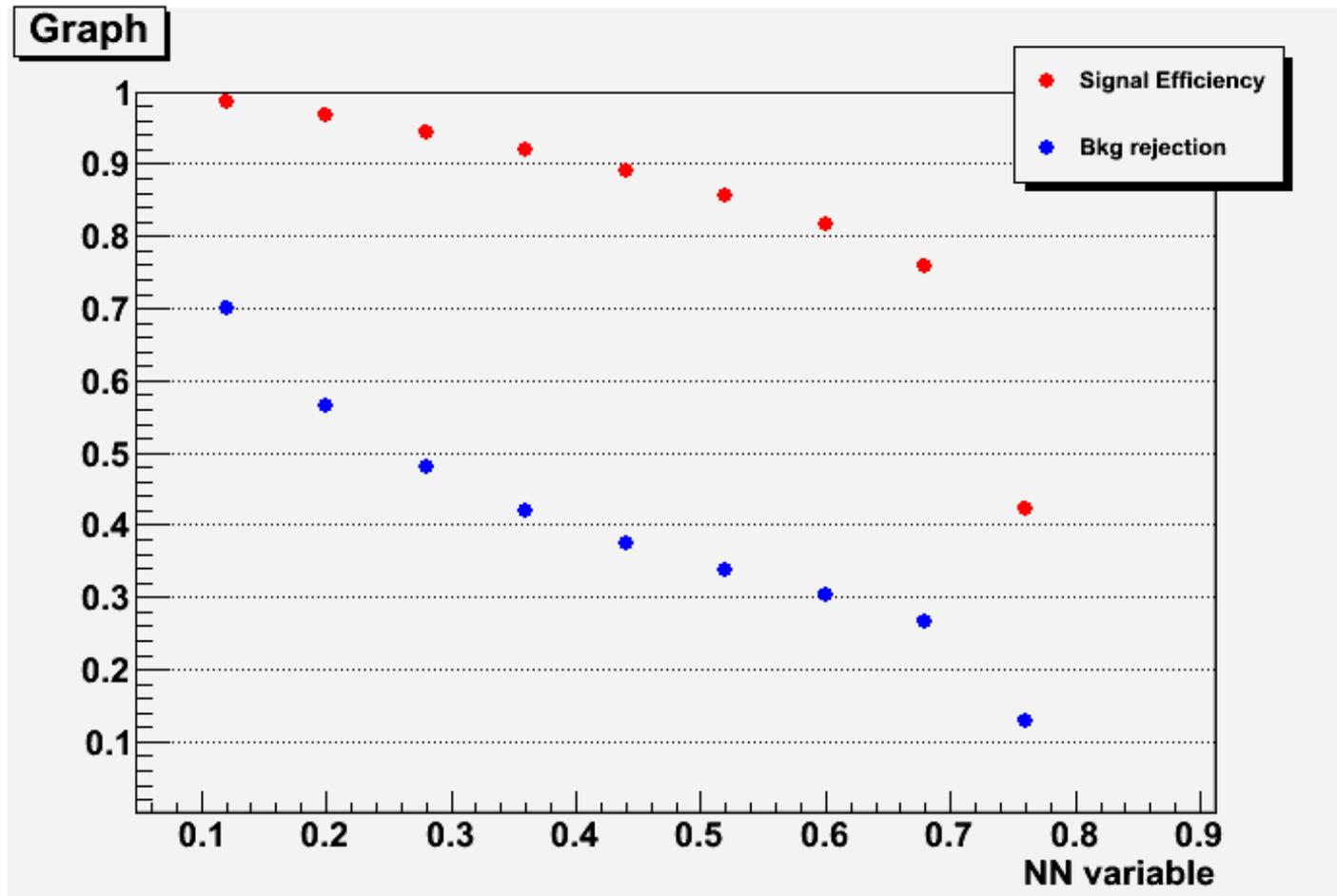
NN result: 10% most central AuAu@200GeV



Testing samples

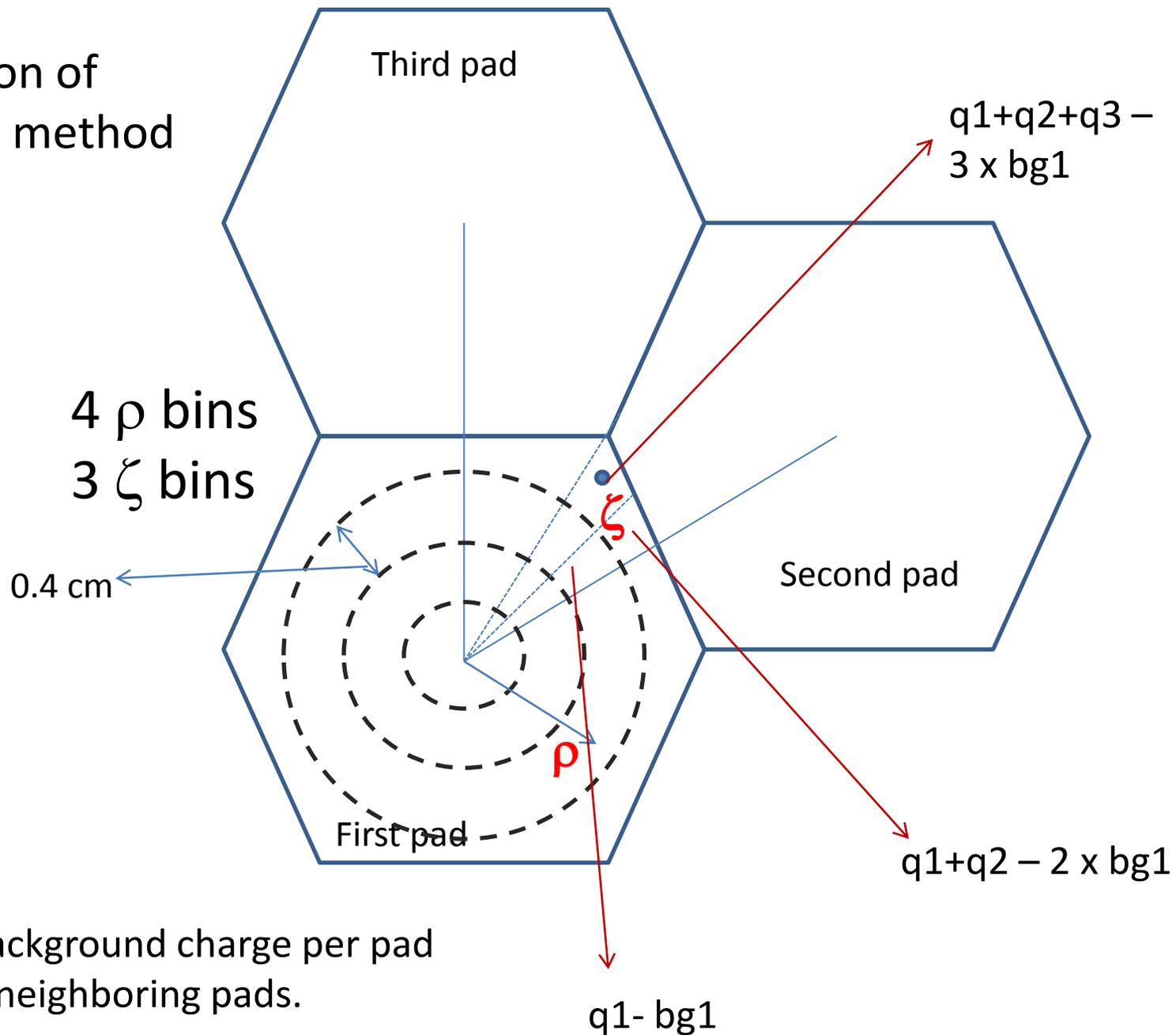
All samples

Efficiency and Rejection



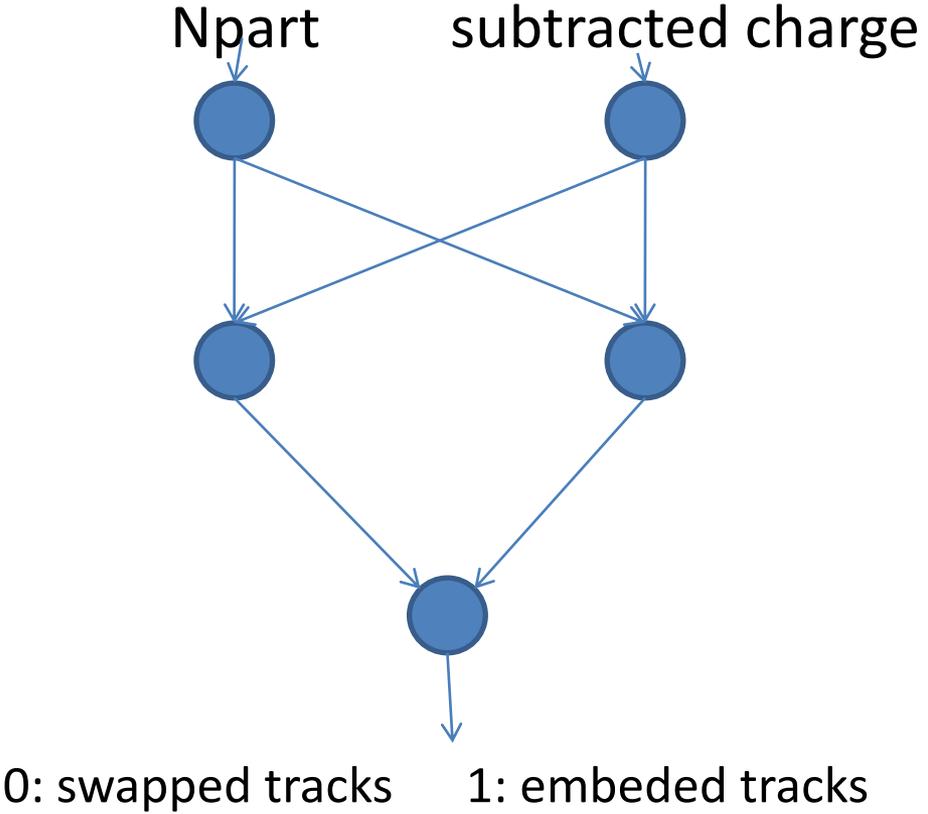
- the NN result is improved when the background charge estimator is subtracted from the raw charge before feeding to the NN

Intimation of Yosuke's method

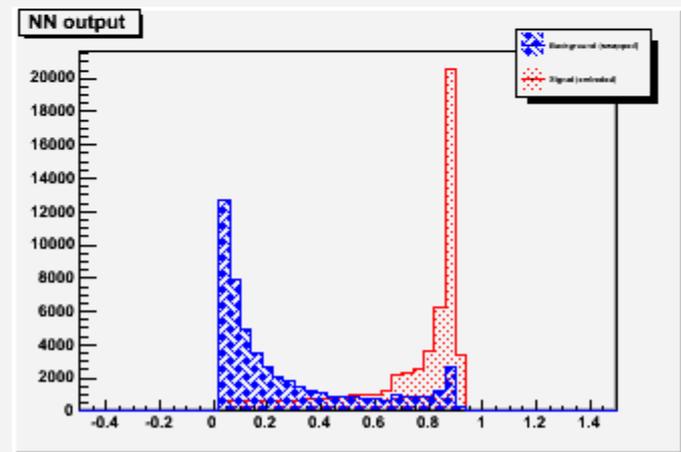
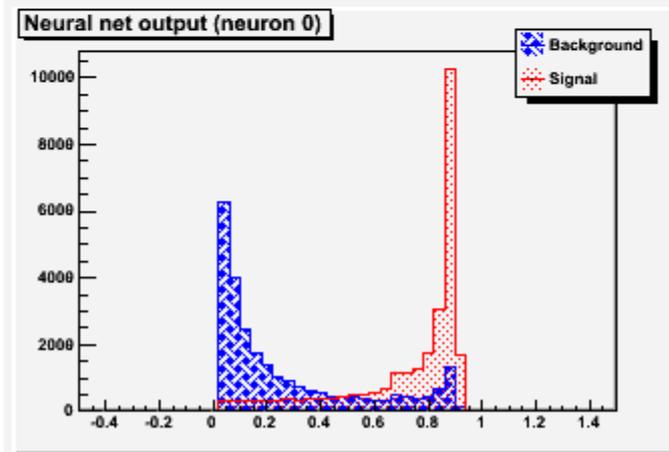
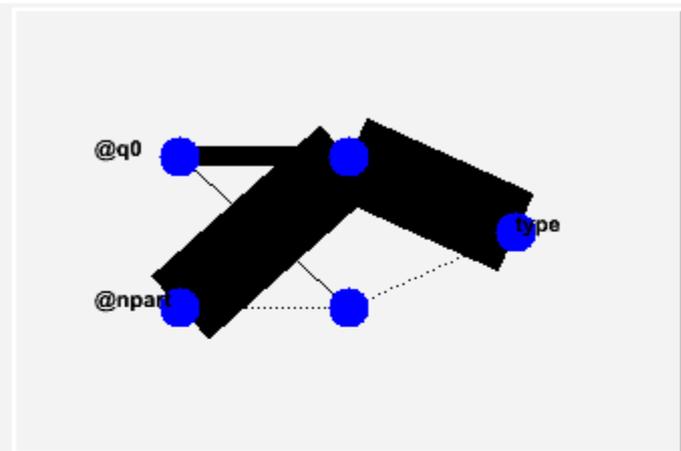
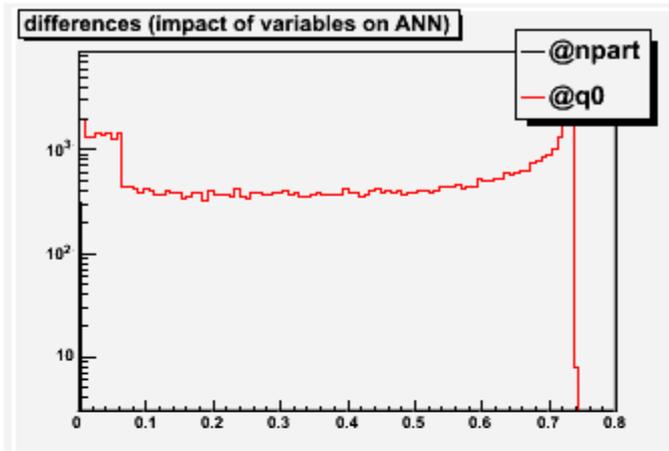


Bg1 is background charge per pad in the 9 neighboring pads.

Intimation of Yosuke's method



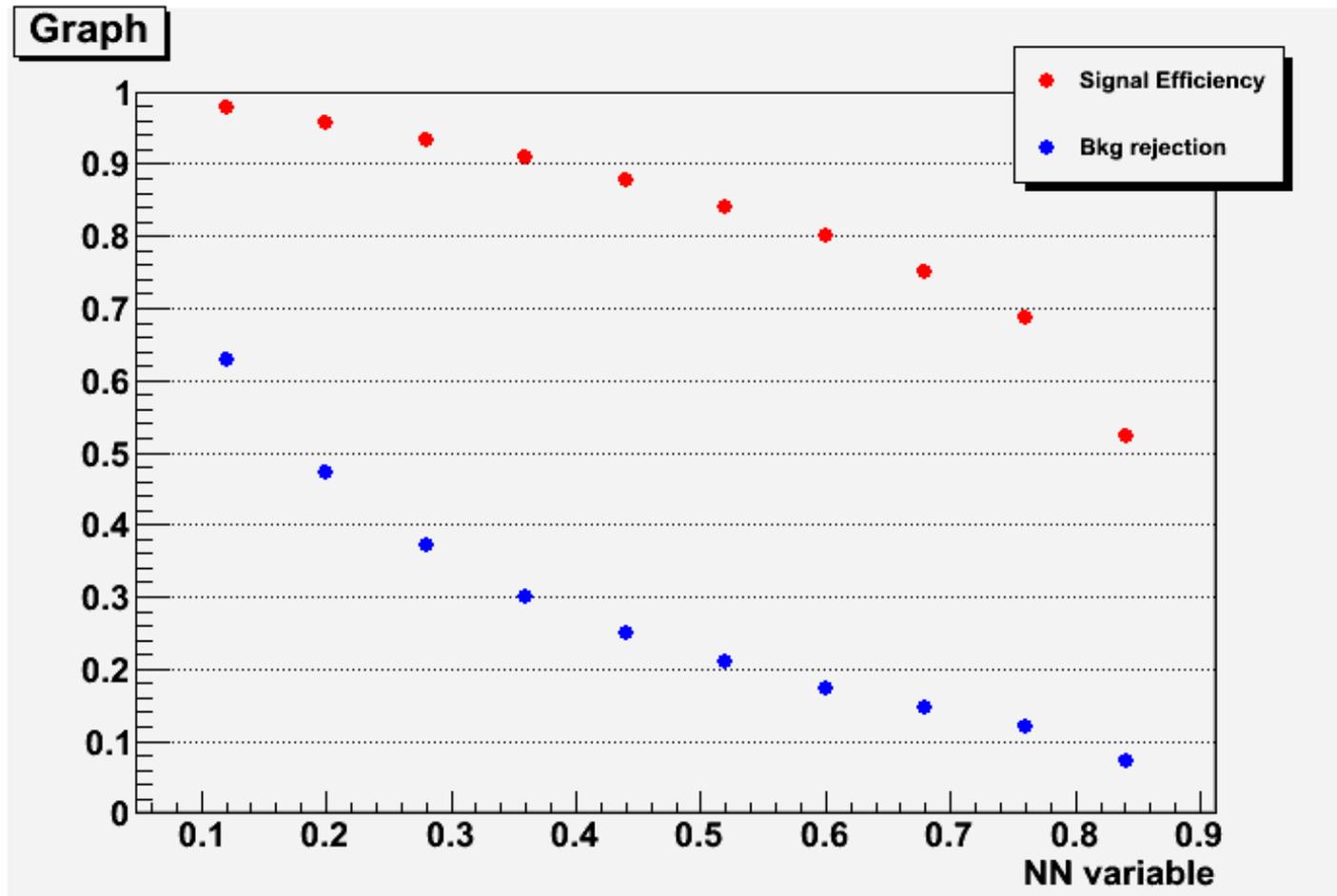
NN result: 10% most central AuAu@200GeV



Testing samples

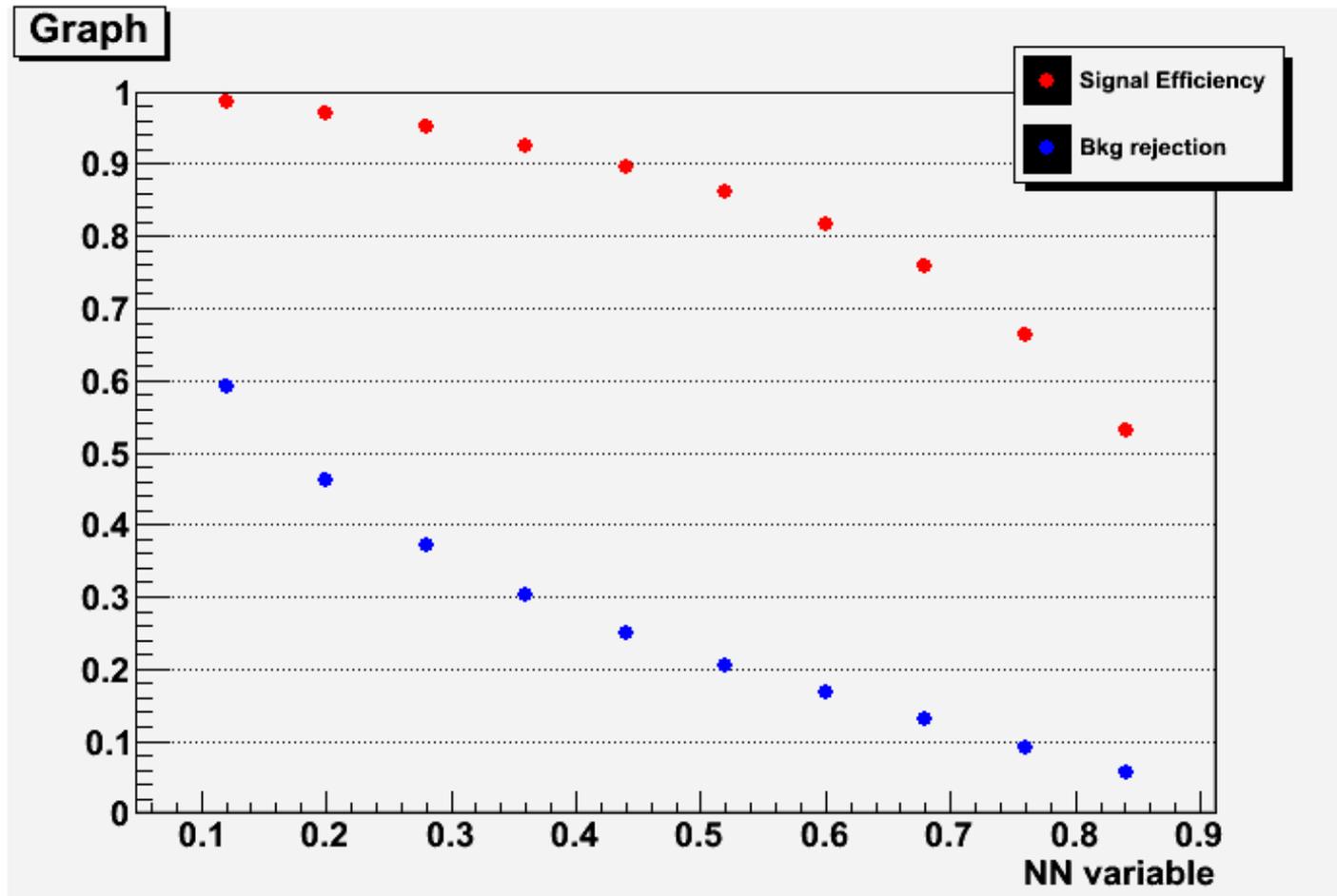
All samples

Efficiency and Rejection



LBS

Efficiency and Rejection



Summary

- Inspired by Yosuke's idea, we feed the track position, neighboring bkg, raw charge on the 3 closest pads into neural networks.
- NN results show nice S/B separation.
- We'll explore NN structure to seek better S/B separation.
- Use Figure of Merit to determine a cut on the NN variable.