Study of the L3 Tau tool with NN

Dutch D0 Meeting

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What will I talk about

- status of the new L3 Tau filter (with NN)
- distributions of the new variables isol, em12isof, nn_out
- effects of the clip function on isol and em12isof
- comparisons between MC and zero bias data, with different NN cuts
- distributions of the input variables for different NN cuts
- efficiency vs. rejection for different NN cuts
- to do list

Stauts of the NN_BASED tool

– put the NN cut in the filter

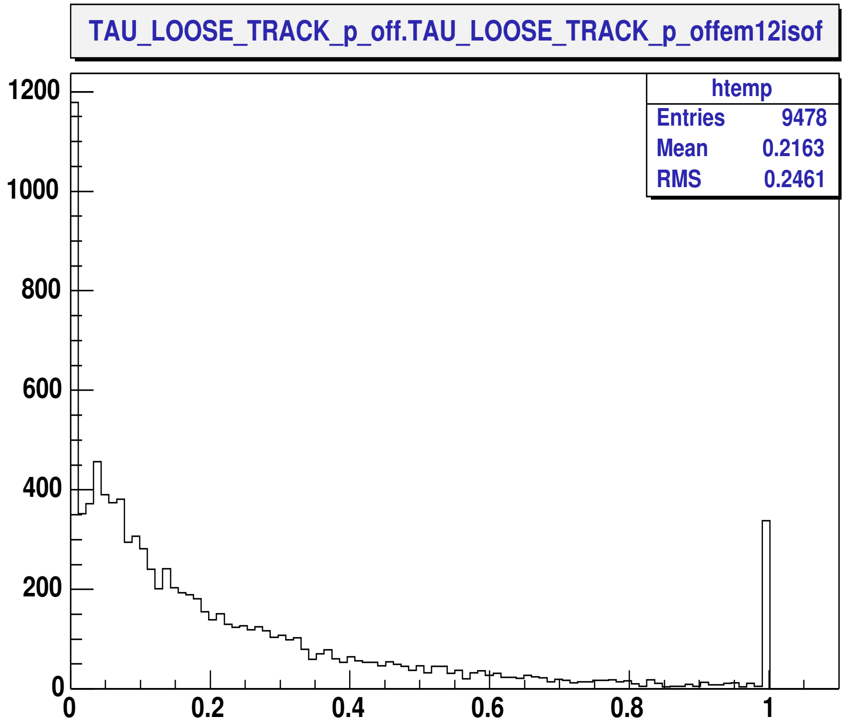
– final versions are in CVS (l3fTauTools > v00-07-00 and l3fTauTools_physres > v00-06-00)

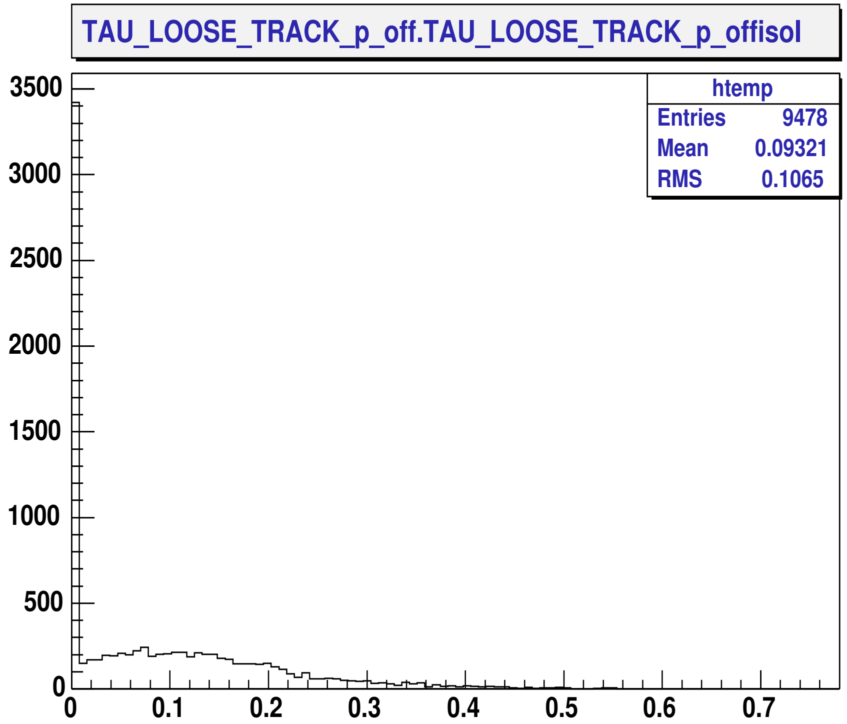
– it's the new default tool in p16

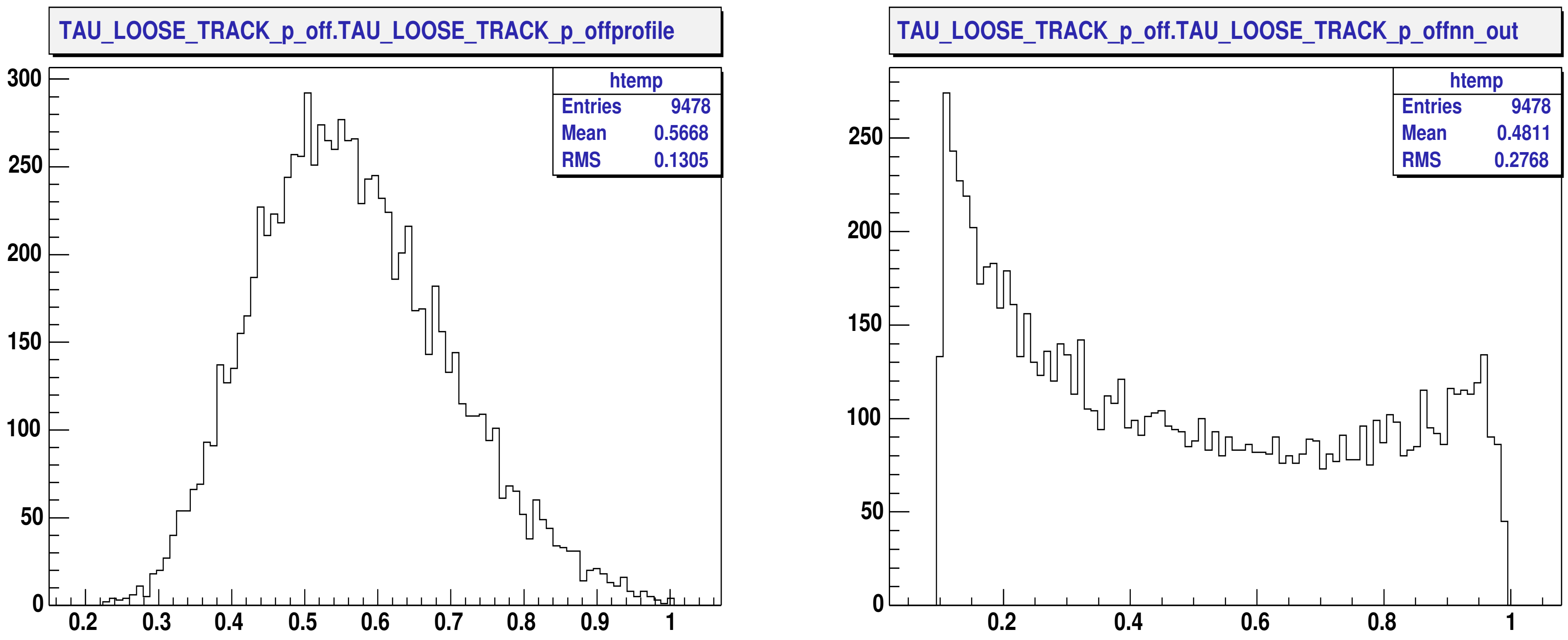
Distributions of the new variables isol, em12isof, nn_out

– the huge spikes are due to the clipping function in the NN algorithm

– this is 9000 events of monitor stream data





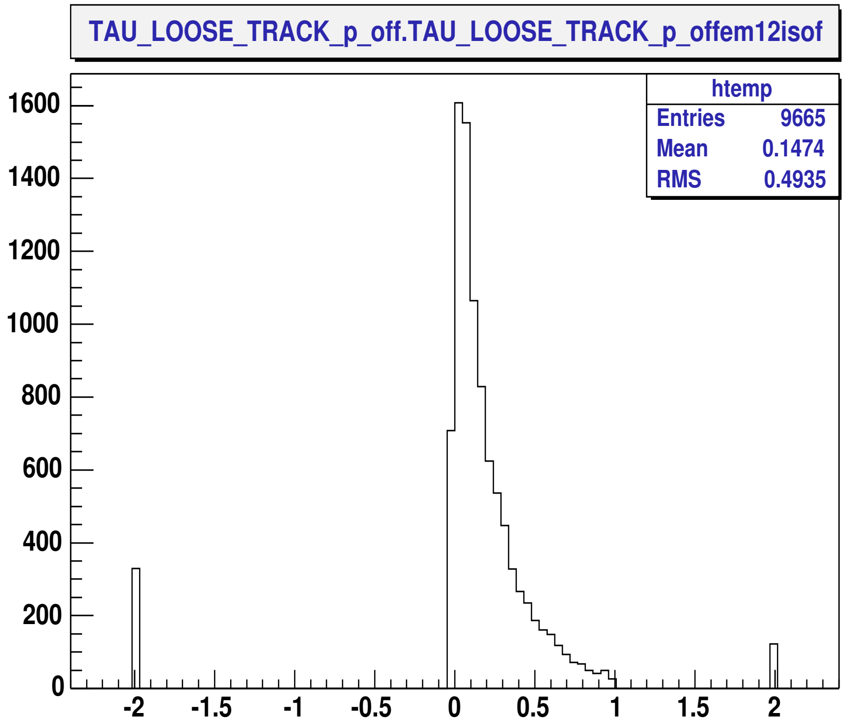


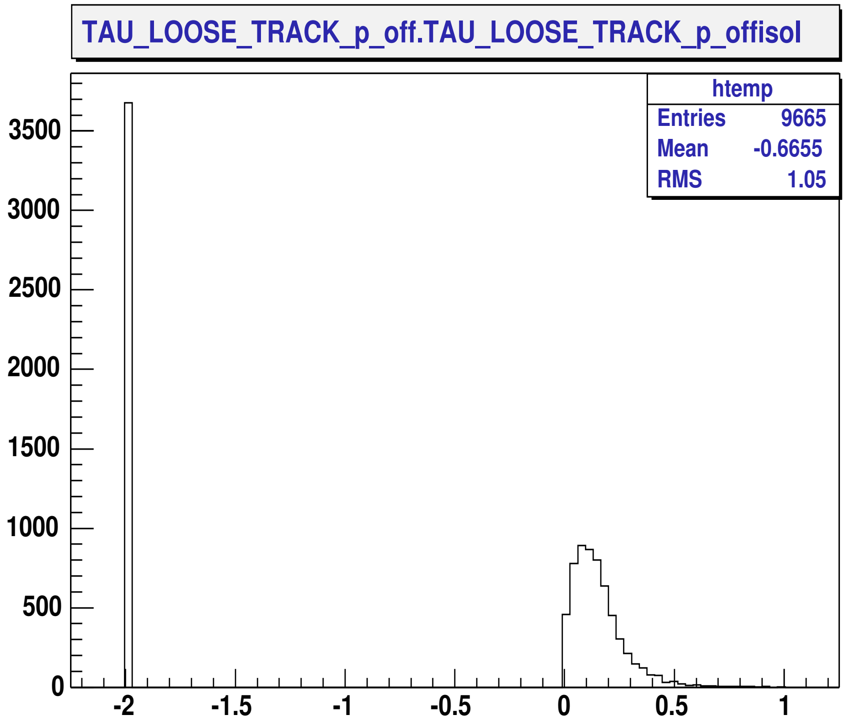
– these distributions, on the other hand, look more or less as expected

Effects of the clip function on isol and em12isof

– to check if this indeed comes from the clip function, I changed it such that it puts everything < 0 at -2 and everything >1 at 2

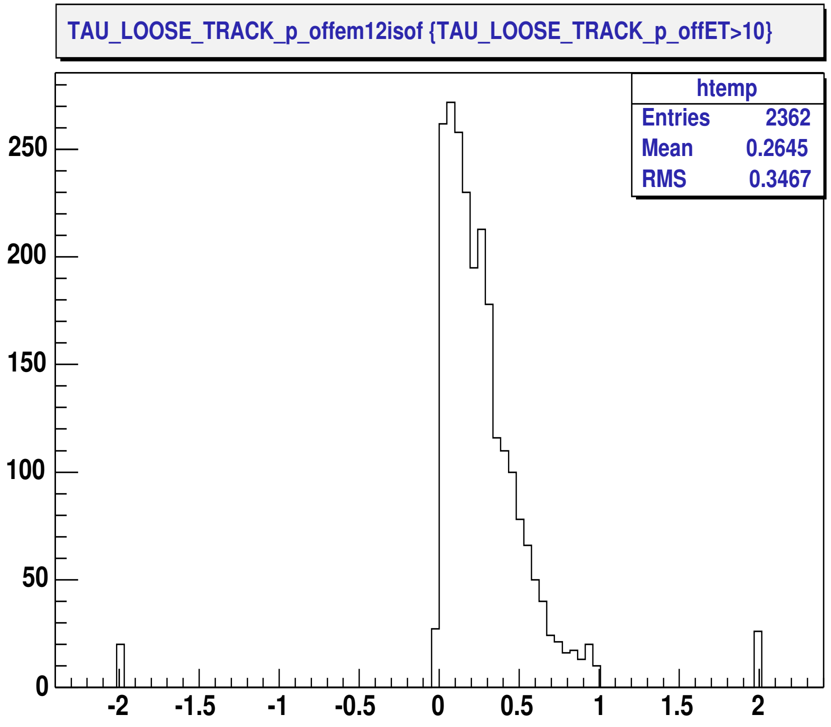
– this had big effect on isol, but not on em12isof

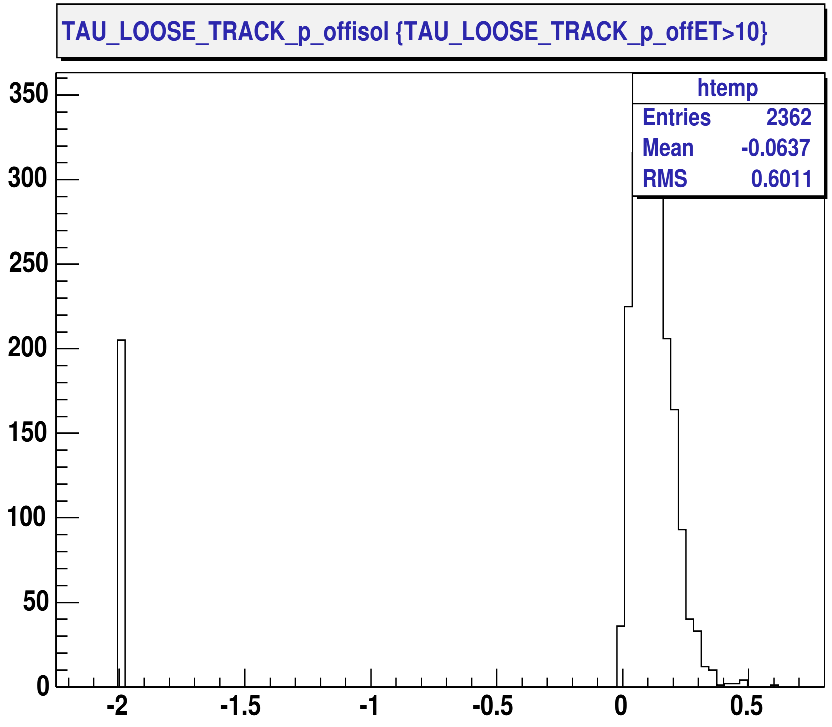




In real life

- suspected that all this comes from low energy stuff
- there is an ET>10 cut in the filter



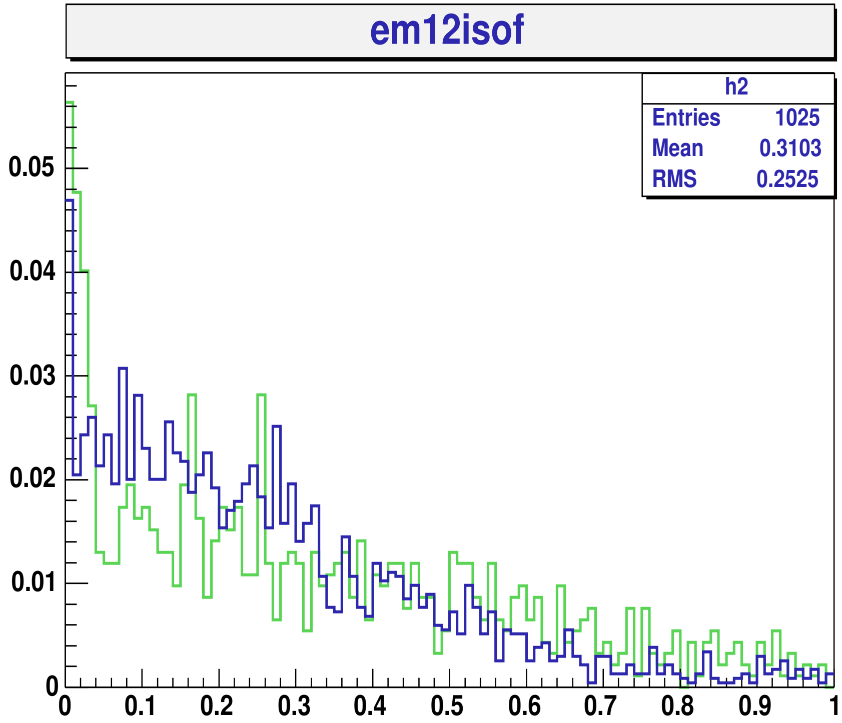


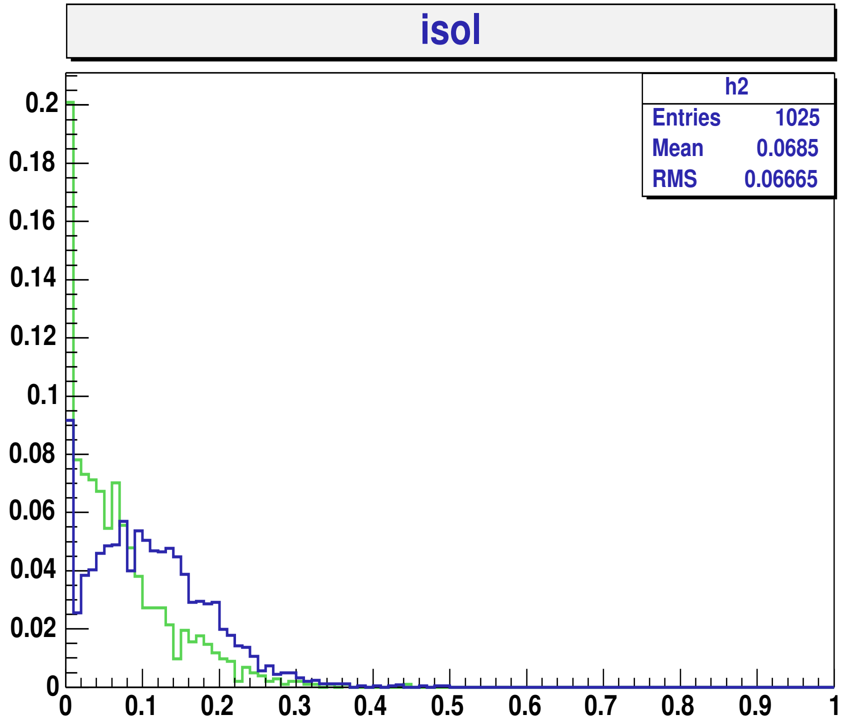
Comparisons between MC and monitor stream data, with different NN cuts

- colour code:

  - blue = monitor stream events with NN cut of 0.1 (background)
  - red = monitor stream events with NN cut of 0.9 (taus?)
  - green = MC events from a W $\rightarrow \tau\nu$ sample

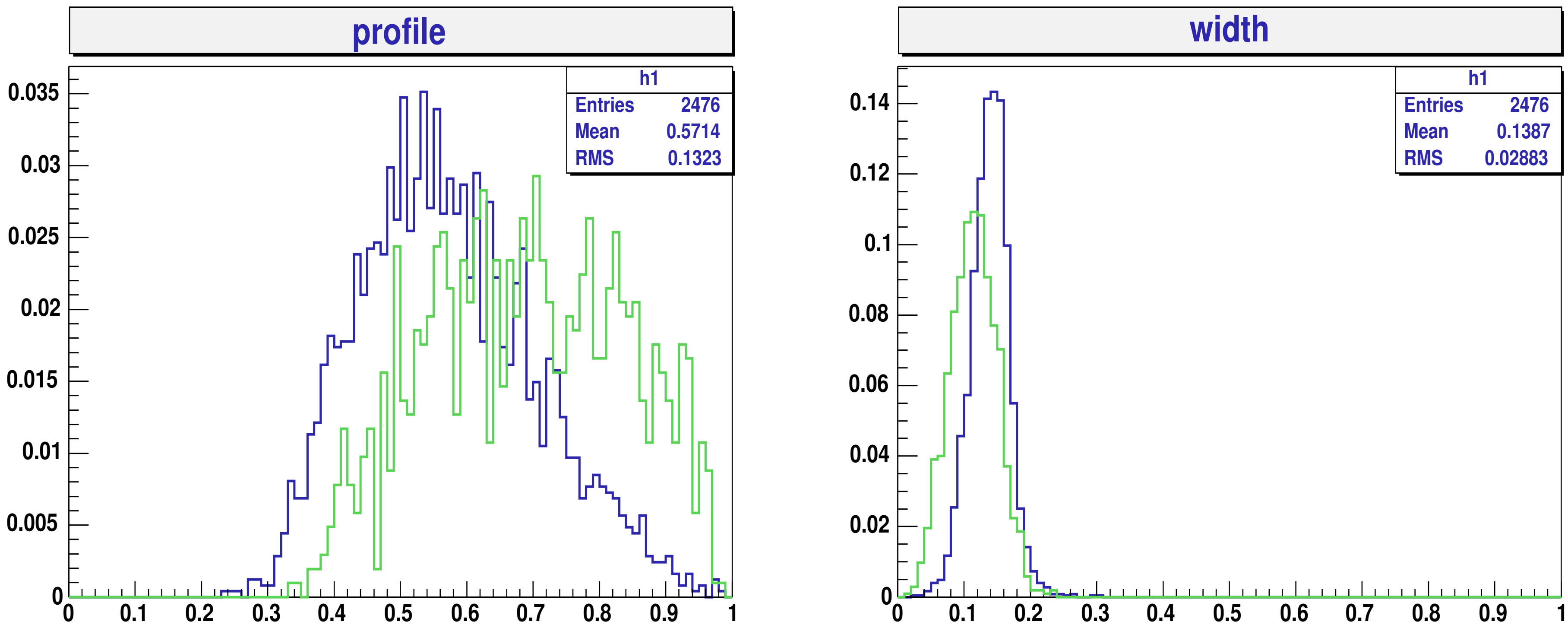
- 9000 monitor stream events, 2000 MC events, plots are normalized with each other



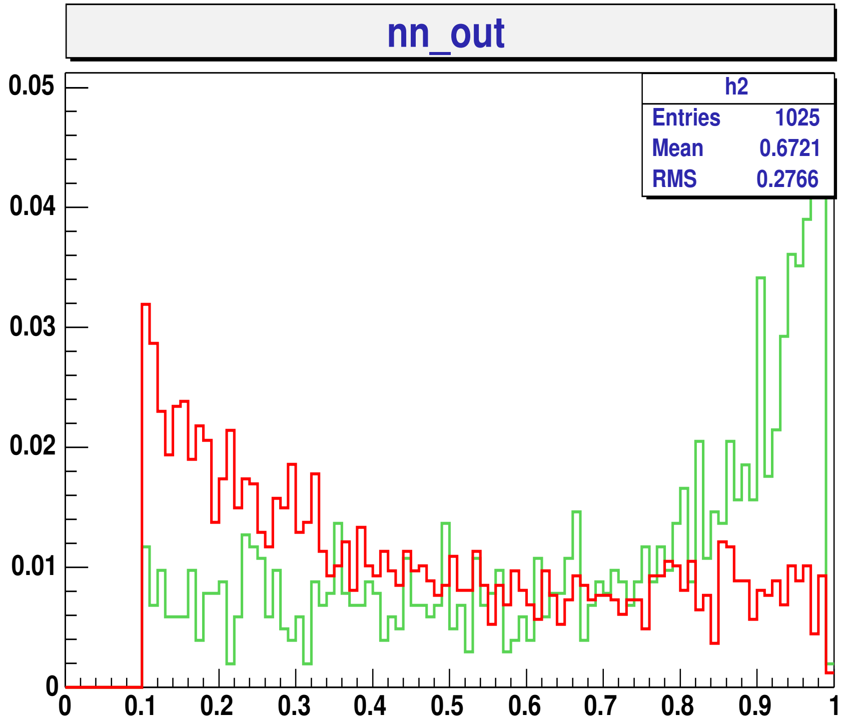


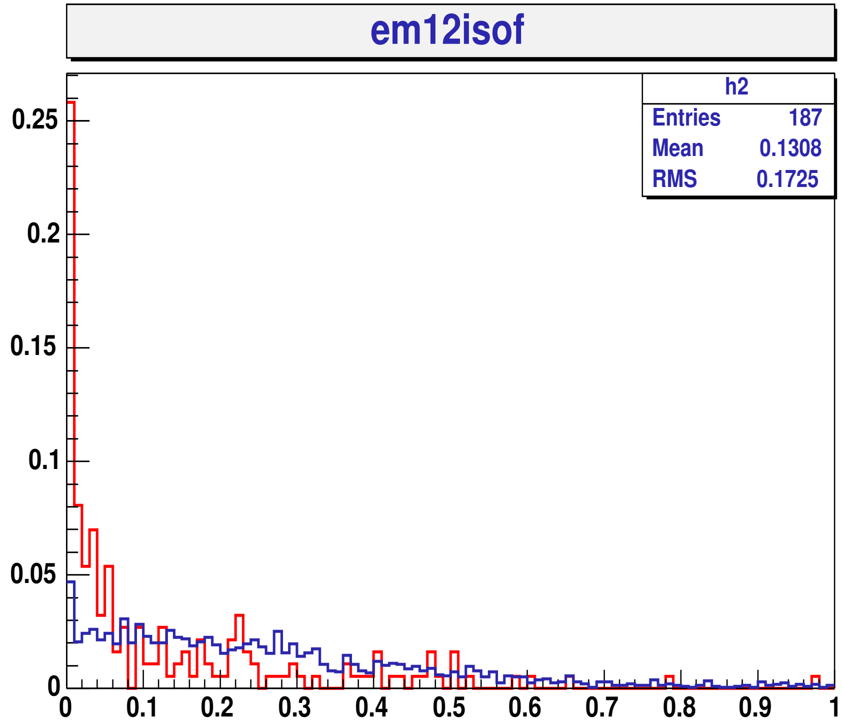
– em12isof doesn't seem to be a very discriminant variable

– isol shows a clearer difference btw. signal (MC) and background



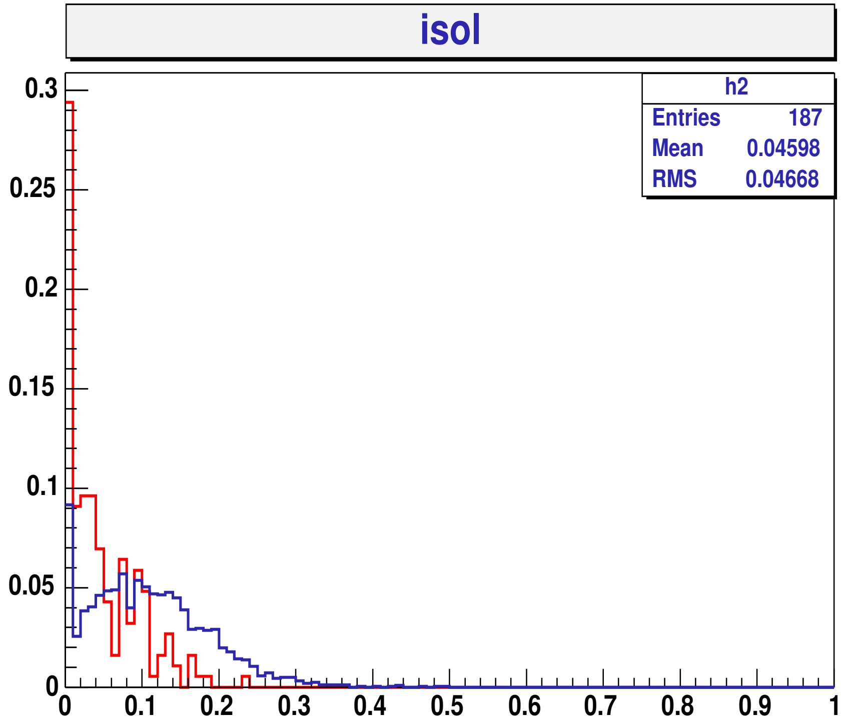
– the other two input variables to NNL3: reasonable difference btw. the signal and the background distributions

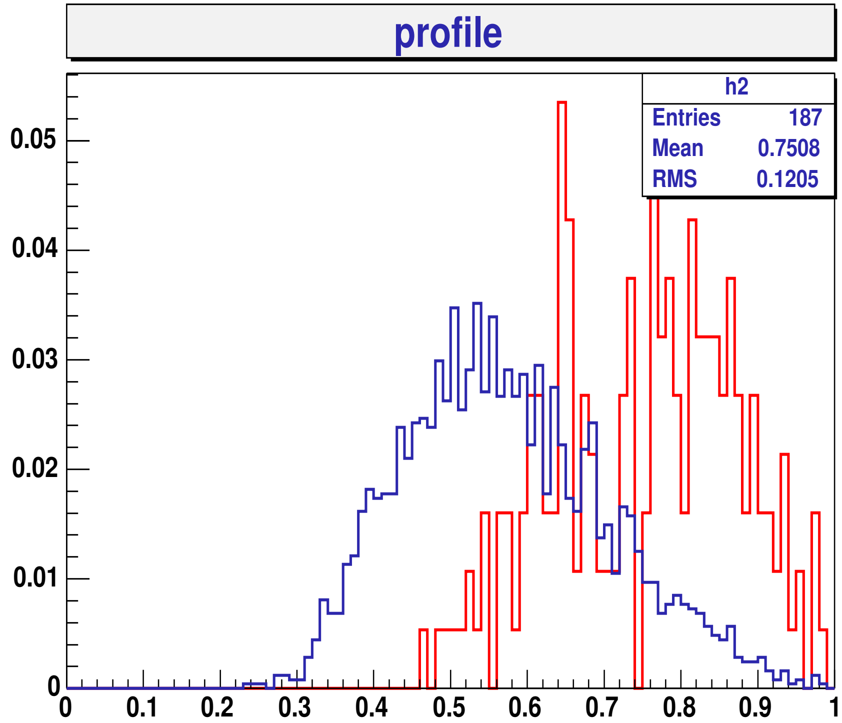




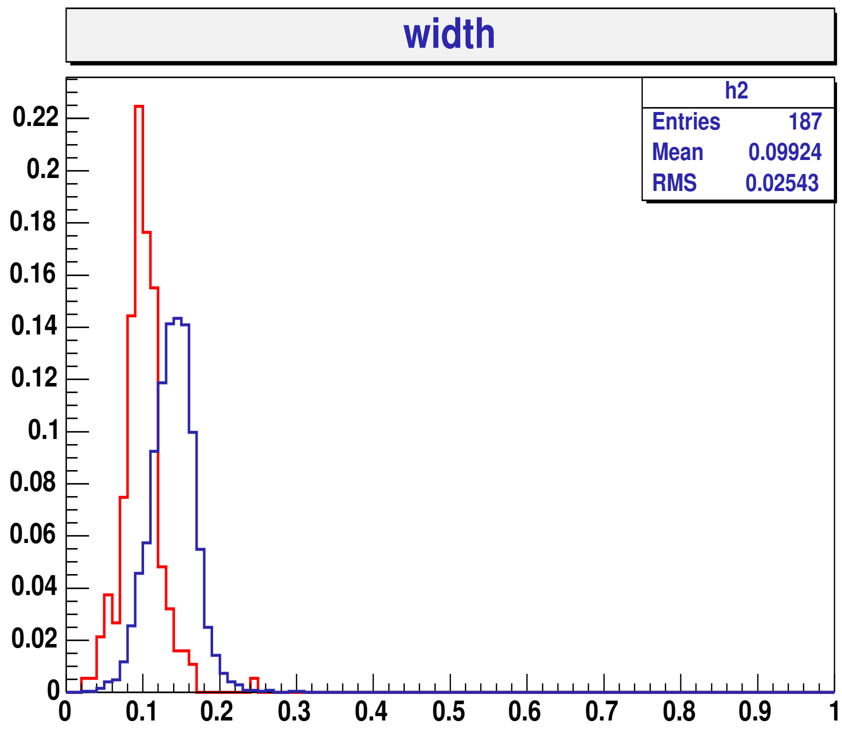
– LEFT: NN output for MC and monitor stream

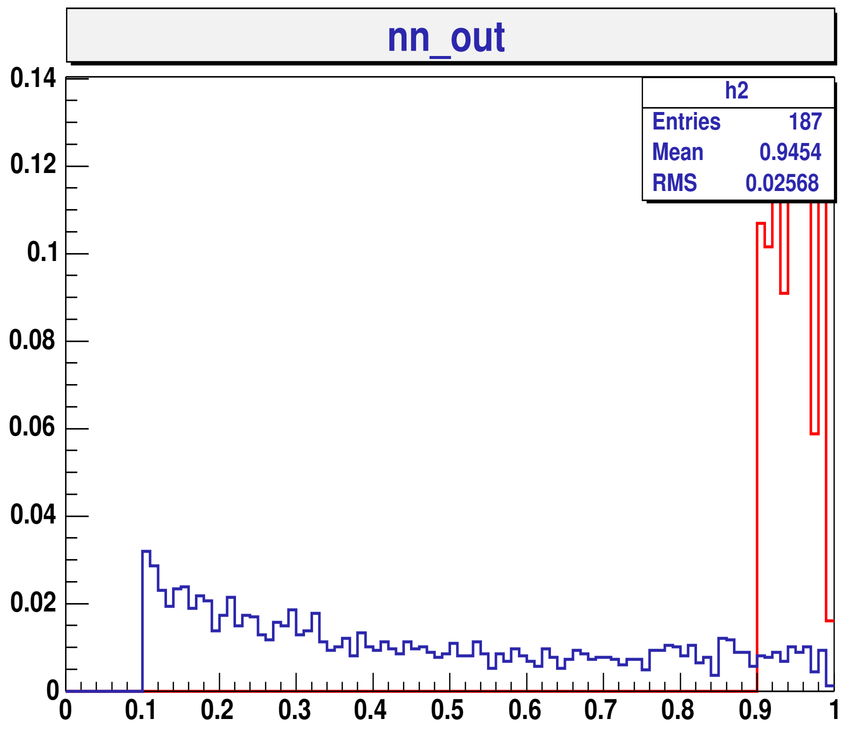
– RIGHT: comparison between events from the monitor stream with 0.9 NN cut (more tau-like) and 0.1 NN cut (background)





– the distributions of the 4 input variables for the events selected with the 0.9 NN cut indeed move towards more tau-like distributions

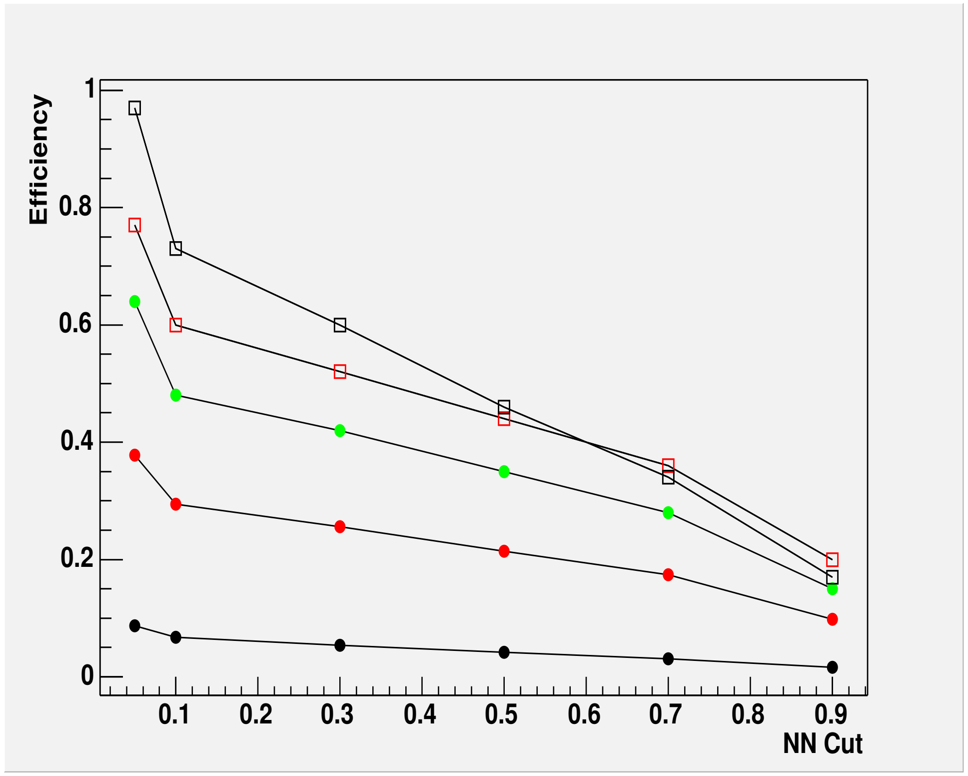

width
h2
Entries 187
Mean 0.09924
RMS 0.02543

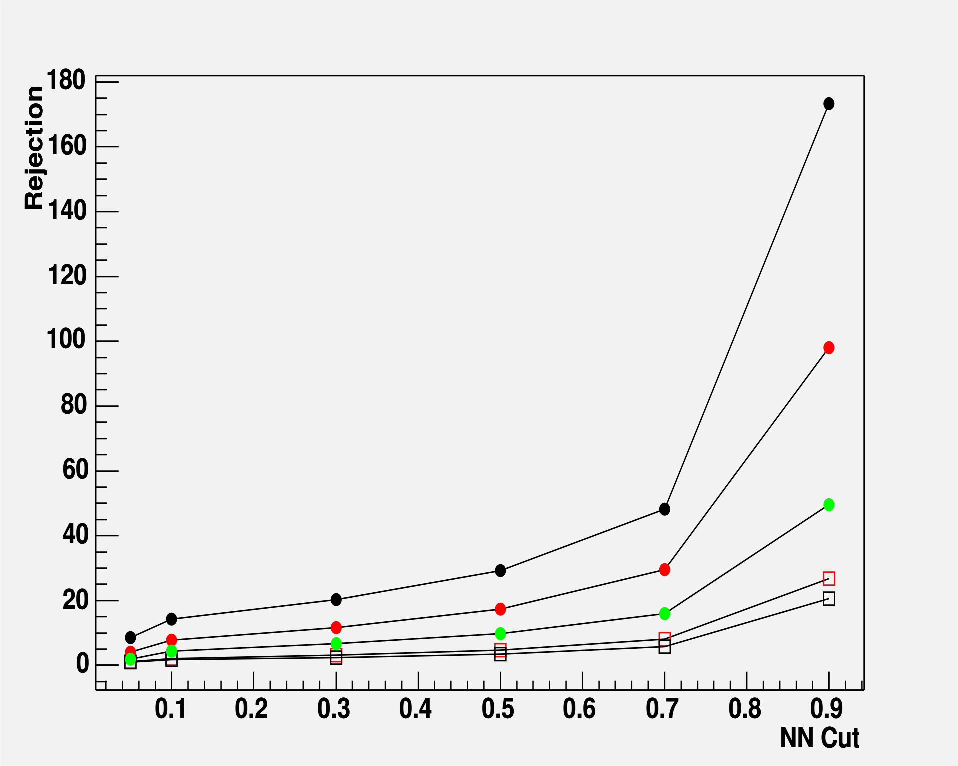

nn_out
h2
Entries 187
Mean 0.9454
RMS 0.02568

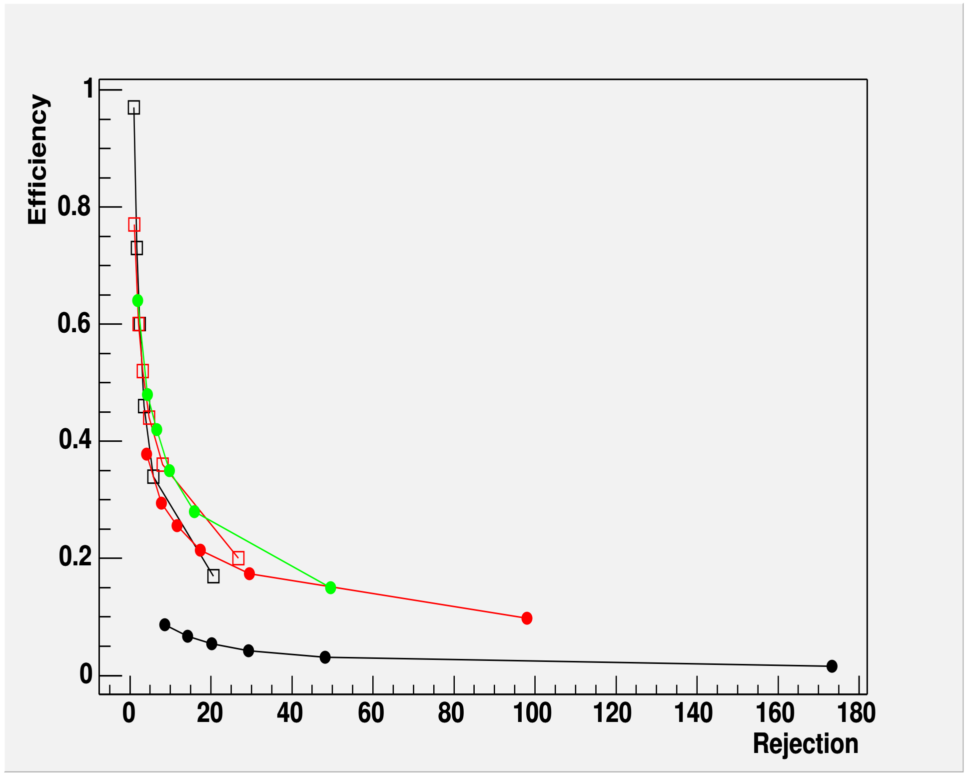
Efficiency vs. Rejection for different NN cuts

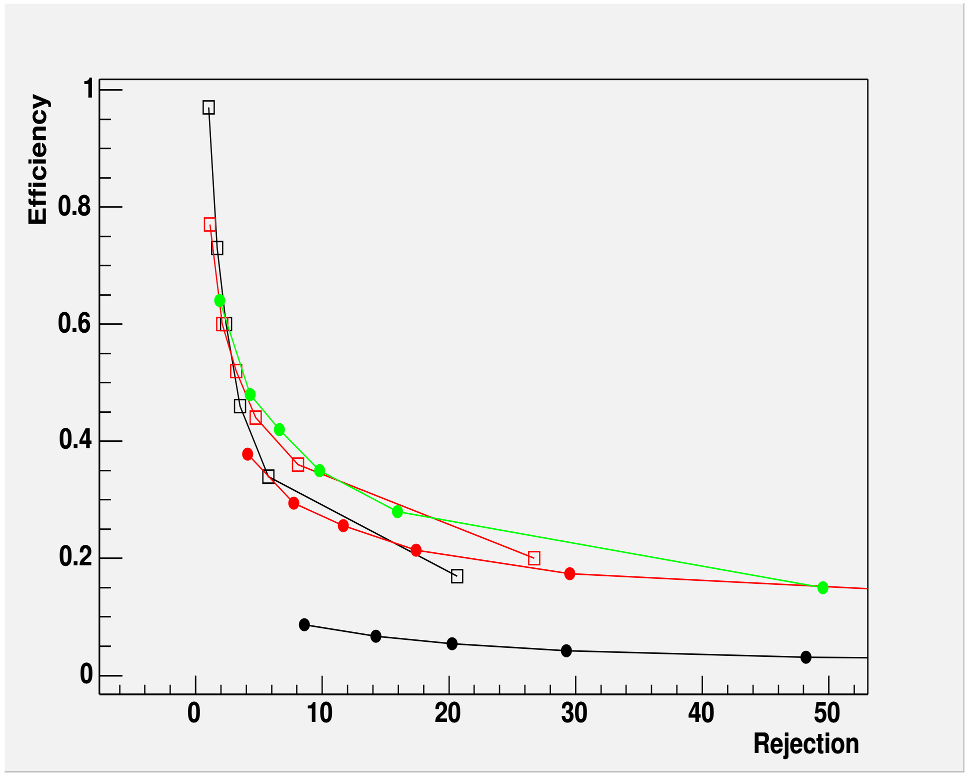
- green: all events red: events that passed a 1-track requirement
  black: events that passed 2 tracks requirement

- squares: efficiency/rejection of the Tau tool itself
- circles: efficiency/rejection including the 1(2) track(s) requirement



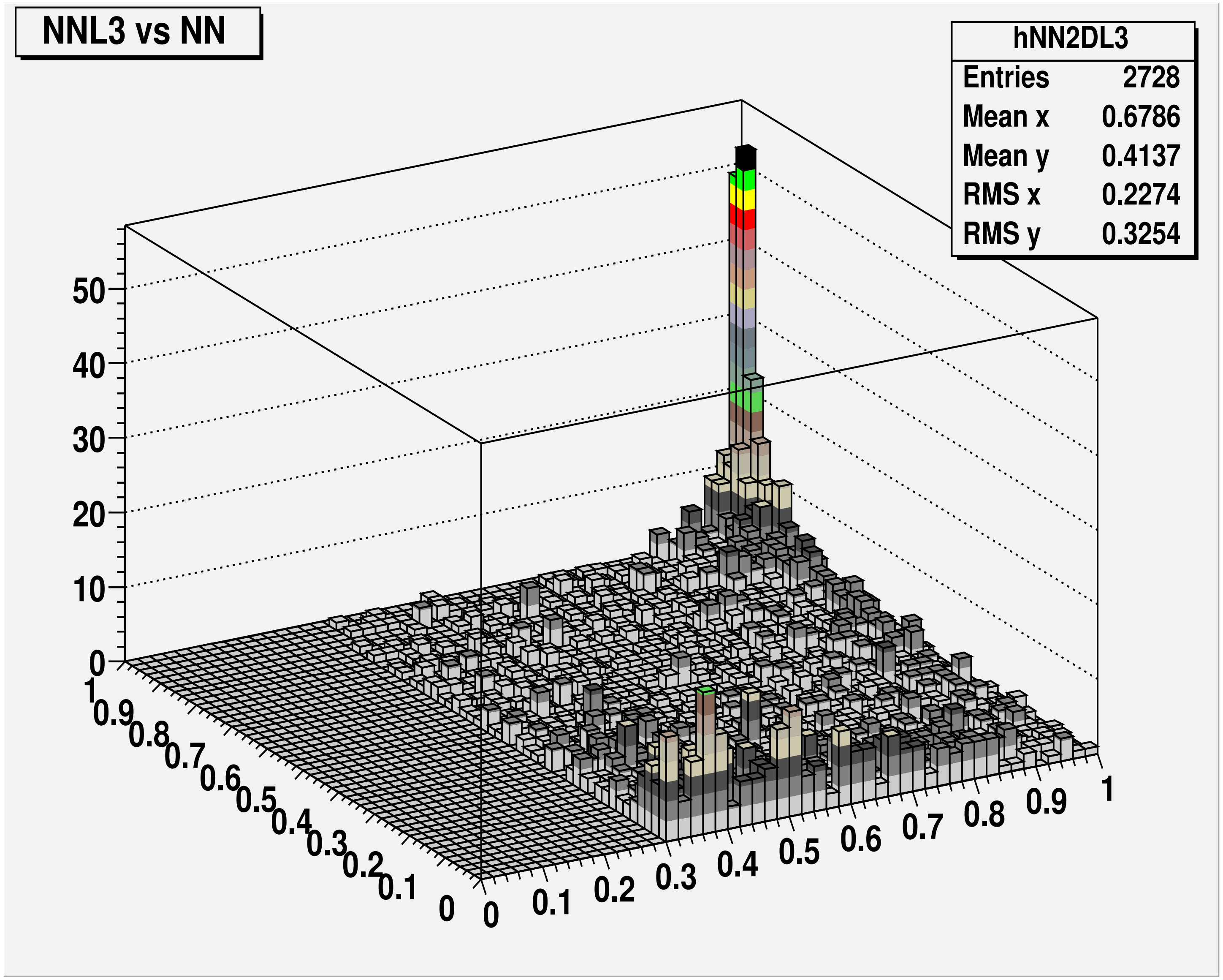






- each point starting from the left represents an NN cut : 0 (CAL_BASED), 0.1, 0.3, 0.5, 0.7 and 0.9
- again green: all events red: events that passed a 1-track requirement black: events that passed 2 tracks requirement
- squares: efficiency/rejection of the Tau tool itself, circles: efficiency/rejection including the 1(2) track(s) requirement

NNL3 comparison with offline NN



To Do List

– run the tool on events (from a few special runs) that pass the proposed L1 triggers to get rates - I am just working on this with Carsten Hensel and Abid Patwa

– write a D0 Note about the tool