

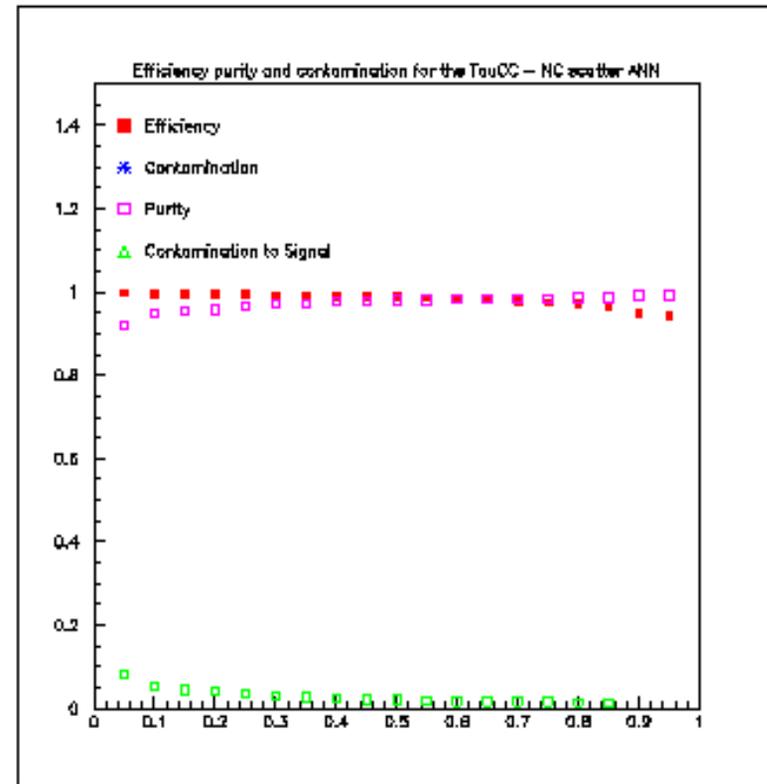
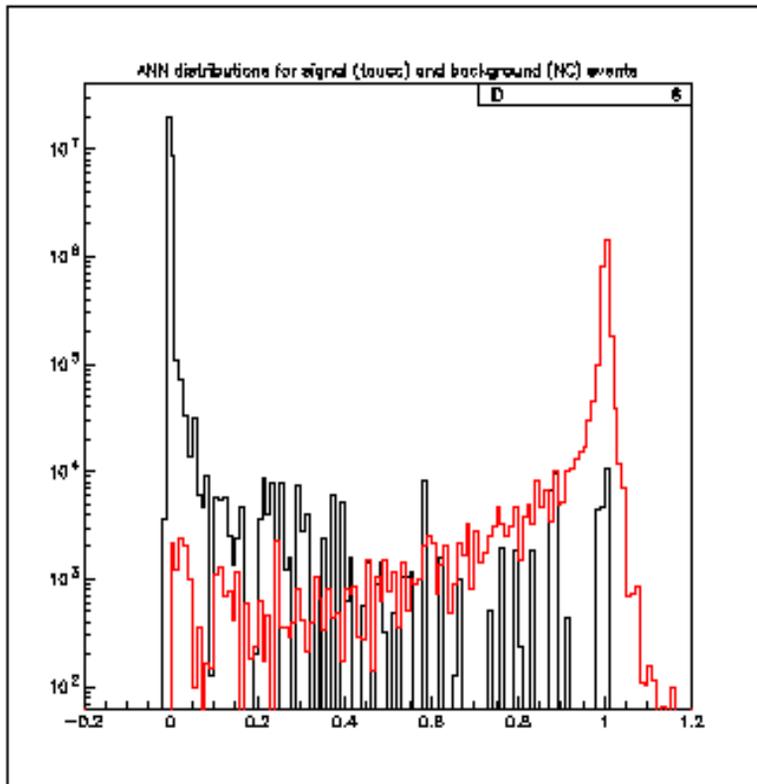
Status report on Vertex predictions and ANN probabilities.

Vertex predictions

- After Emily and Carolyn checked the 6 new events we have send the vertex predictions along with their errors to Nonaka.
- Altogether there are ~ 20 events with new vertex predictions send to Nonaka so far.

-ANN v_T CC - hadron scattering cont.-

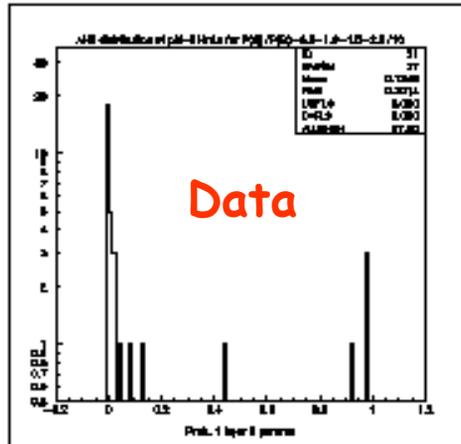
Output ANN function (in log scale) (momentum smeared by 30%)
Efficiency, Purity and contamination



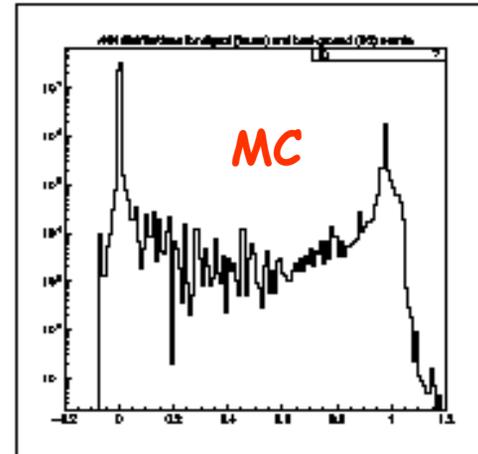
•The performance of the ANN is quite satisfactory as far as its discriminating power is concerned. With the cut@ 0.5 we select tau decays with

~99% efficiency & ~99% purity

-ANN v_T CC - hadron scattering results on the 37 recognized kinks-



$\Delta p/p=30\%$



EVENTS THAT EXCEEDED THE 0.5 CUT IN THE ANN OUTPUT FUNCTION

<u>RUN</u>	<u>EVENT</u>	<u>P_d</u>	<u>θ_d</u>	<u>P_T</u>	<u>L_d</u>	<u>θ_p</u>	<u>$\Delta\phi$</u>	<u>Probabilities</u>
3263	25102	1.900	0.1300	0.247	1890.1	0.1772	0.176	0.136***
3024	30175	2.900	0.0936	0.271	4504.8	0.0279	1.027	0.971
3039	1910	4.600	0.0895	0.412	276.5	0.0653	2.684	1.000
3333	17665	21.400	0.0130	0.278	564.6	0.0154	2.806	1.000
3193	1361	20.000	0.0187	0.374	1863.6	0.0838	2.341	1.000 CHARM

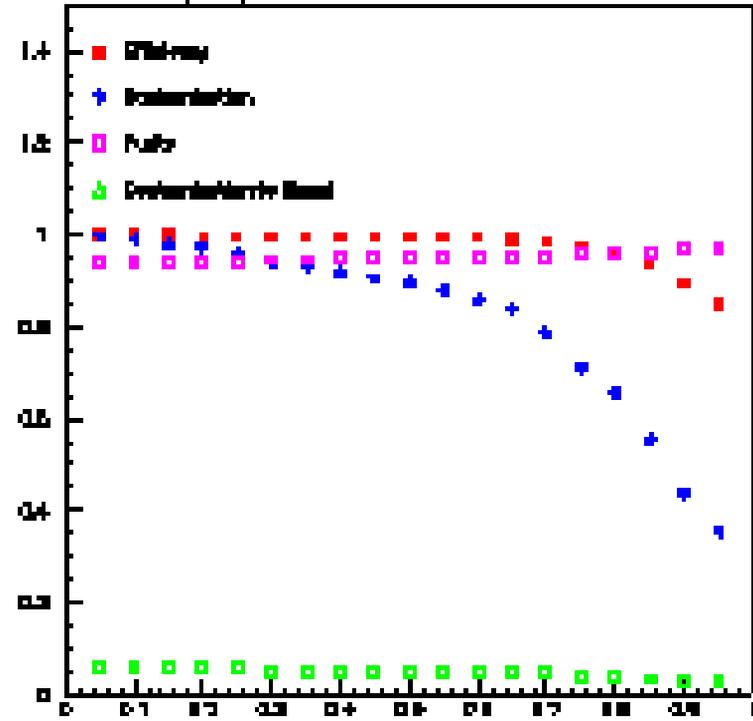
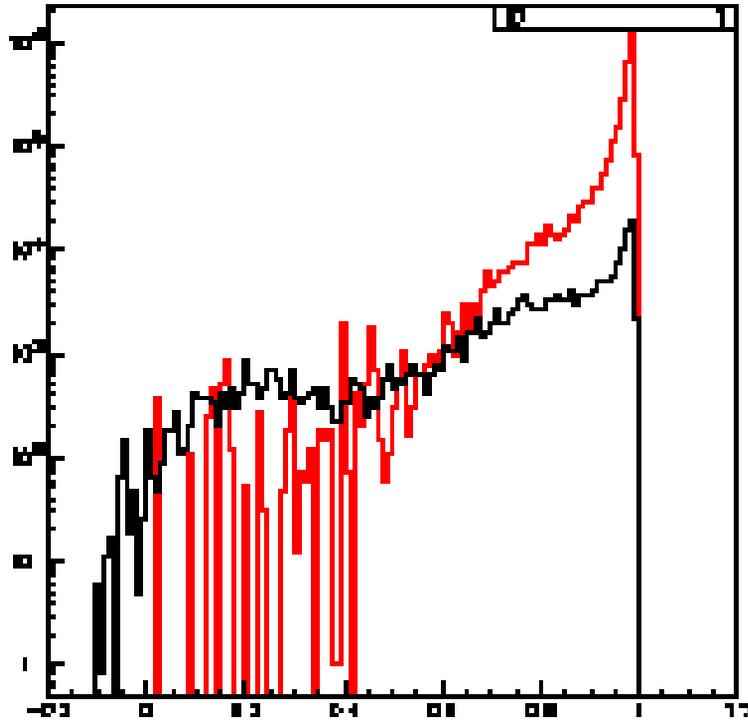
- Considering as "Signal" events (v_T CC) the ones with probabilities $P > 0.5$ we can compute the background to these events by adding $1-P$. Therefore :

$$\text{Bkg} = 0.029$$

-ANN v_T CC - charm one prong kink decay-

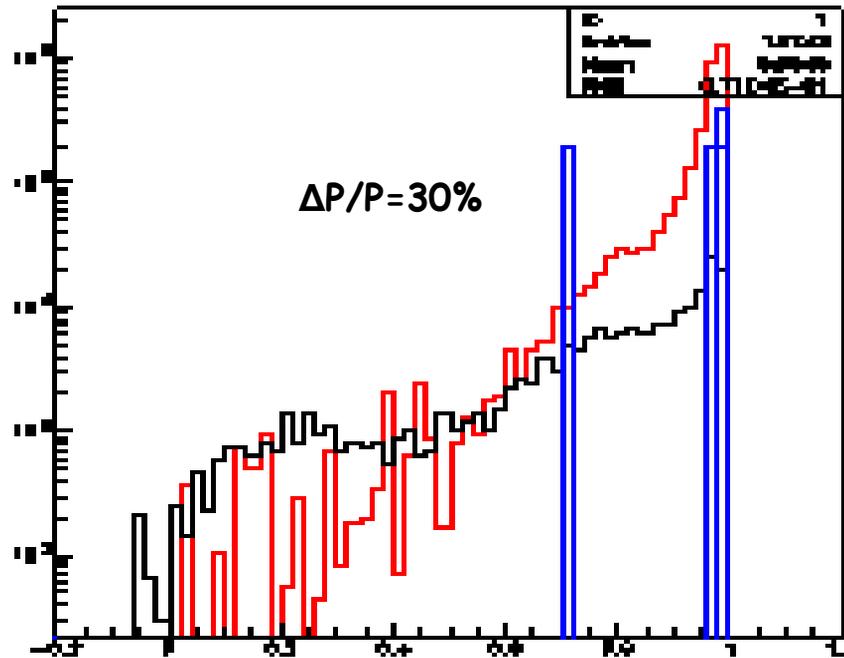
Output ANN function (in log scale) (momentum smeared by 30%)

Efficiency, Purity and contamination



- The classification is poor (as expected), since all variables characterizing these two populations are almost identical.
- However the event probabilities obtained from this ANN analysis can be used to compute the background from this second source (charm one prong kink decays where the lepton from the primary is missed)

-ANN ν_τ CC - charm one prong kink decay background estimation-



RUN	EVENT	P_d	θ_d	P_τ	L_d	θ_p	$\Delta\phi$	Prob.
3024	30175	2.900	0.0936	0.271	4504.8	0.0279	1.027	0.710
3039	1910	4.600	0.0895	0.412	276.5	0.0653	2.684	0.990
3333	17665	21.400	0.0130	0.278	564.6	0.0154	2.806	0.990
3193	1361	20.000	0.0187	0.374	1863.6	0.0838	2.341	0.990 CHARM

We compute the background to these events by adding $1-P$. Therefore :

$$\text{Bkg} = 0.310$$

-Tau neutrino CC and Charm interactions-

ν_τ CC 1-prong observed : 3.00 ± 0.34 individual event probabilities

(ν_τ CC 1-prong observed : 4.00 ± 0.34 P_T cut)

Poisson Probability of the Background fluctuating to the Signal Level :

4.6×10^{-3} (4×10^{-4})

ν_τ CC 1-prong expected : 5.3 ± 1.6

ν_τ CC candidates observed : 6

ν_τ CC candidates expected : 6.3 ± 1.8

Charm events observed : 8

Charm events observed : 6.9 ± 1.8

Charged Charm events observed : 4

Charged Charm events observed : 3.0 ± 1.2

Charged Charm 1-prong events observed : 3

Charged Charm 1-prong events observed : 1.3 ± 0.5

On going work

- We plan to do an ANN analysis with the trident events as soon as the ntuples produced by Byron are in their final form.
- We are going to compare the “new” numu CC events, when they are finalized also, with the ANN results.