



# Using T2K Monte Carlo

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# Outline



- Efficiency tables when running on T2K MC
- Reproducing Maxim's plot (not quite there yet)
- Problems..

# Efficiency tables on MC

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Rec Enu	0~0.35	0.35~0.85	0.85~1.5	1.5~
Nu-mu CC				
fcfv	2002.8	1658.1	491.3	1066.3
1ring	1719.0	1396.2	241.6	480.0
e-like	31.0	20.7	7.9	27.2
nodecay-e	11.8	8.2	3.0	12.8
likelihood	2.1	2.4	1.7	4.7
efficiency	17.5%	29.9%	56.4%	36.3%

\*\*\*\*\*

NC				
fcfv	365.4	228.8	85.7	83.3
1ring	88.7	66.0	25.9	40.9
e-like	53.2	57.0	24.8	39.4
nodecay-e	50.2	52.9	20.7	32.5
likelihood	6.6	15.2	7.1	15.8
efficiency	13.1%	28.6%	34.5%	48.5%

\*\*\*\*\*

Nu-e CC				
fcfv	11.2	36.4	33.5	72.7
1ring	5.6	21.4	16.7	37.0
e-like	5.5	21.2	16.6	36.9
nodecay-e	4.7	18.7	14.4	30.5
likelihood	3.9	15.0	11.2	23.0
efficiency	82.9%	80.0%	78.0%	75.3%

Can be compared  
with Maxim's

→ See later

# Compare ATM/T2K MC

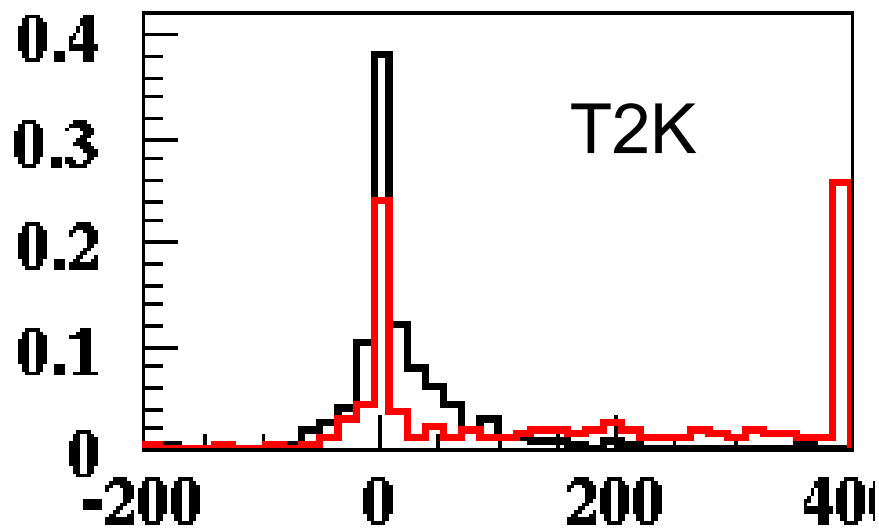
Not as good on T2K MC

Erec(GeV)	5 variables +frac + xalong + cosopen			running on T2K		
	Signal	Bckg( $\nu\mu$ CC)	Bckg(NC)	Signal	Bckg( $\nu\mu$ CC)	Bckg(NC)
0~0.35	90.3%	16.4%	9.8%	82.9%	17.5%	13.1%
0.35~0.85	83.2%	31.6%	21.2%	80.0%	29.9%	28.6%
0.85~1.5	79.4%	12.0%	23.1%	78.0%	56.4%	34.5%
1.5~	76.0%	14.3%	34.5%	75.3%	36.3%	48.5%

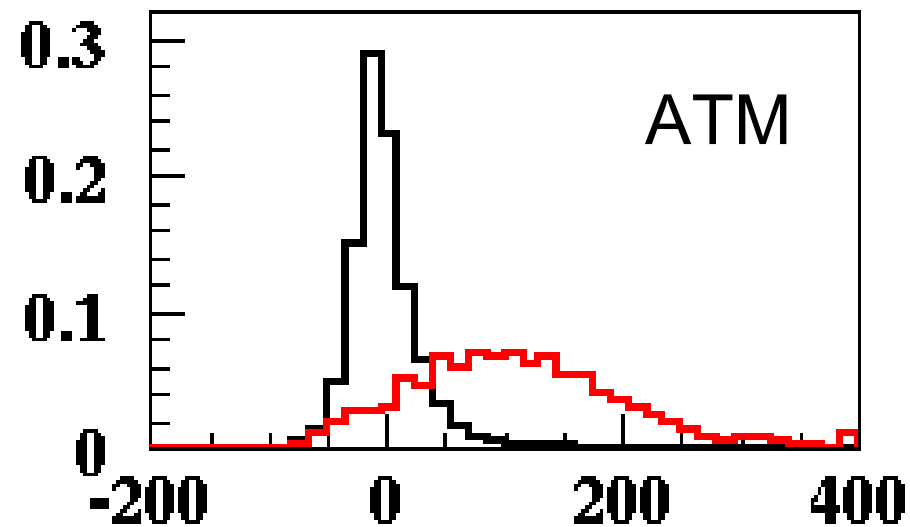
Only a few events  
not too bad.

# Probable cause

Bad version of polfit for T2K → Need to reapply ?



$\pi^0$  likelihood



$\pi^0$  likelihood

# Maxim's table

	$\nu_\mu$ CC mis-ID	NC	Beam $\nu_e$
FC,FV,Evis>100 (MeV)	2081.7	801.37	182.9
Single ring	983 (47.2%)	214.7 (26.8%)	89 (48.7%)
E-like	39.0 (1.9%)	168.3 (21.0%)	86.7 (47.4%)
No decay e-	13.6 (0.65%)	149.9 (18.7%)	72.4 (39.6%)
0.35<E $\nu$ <0.85 (Gev)	1.37(0.07%)	50.8 (6.3%)	20.7 (11.3%)
Cos $\theta_{\nu\text{lepton}} < 0.9$	1.025 (0.05%)	35.8 (4.5%)	17.5 (9.6%)
Polfit M $\gamma\gamma < 100$ MeV/c $^2$	0.47 (0.02%)	11.8 (1.5%)	13.9 (7.6%)
$\Delta\log\text{Likelihood} < 80$	0.35(0.017%)	9.8 (1.2%)	13.5 (7.4%)

Can be compared  
with me!

8.2

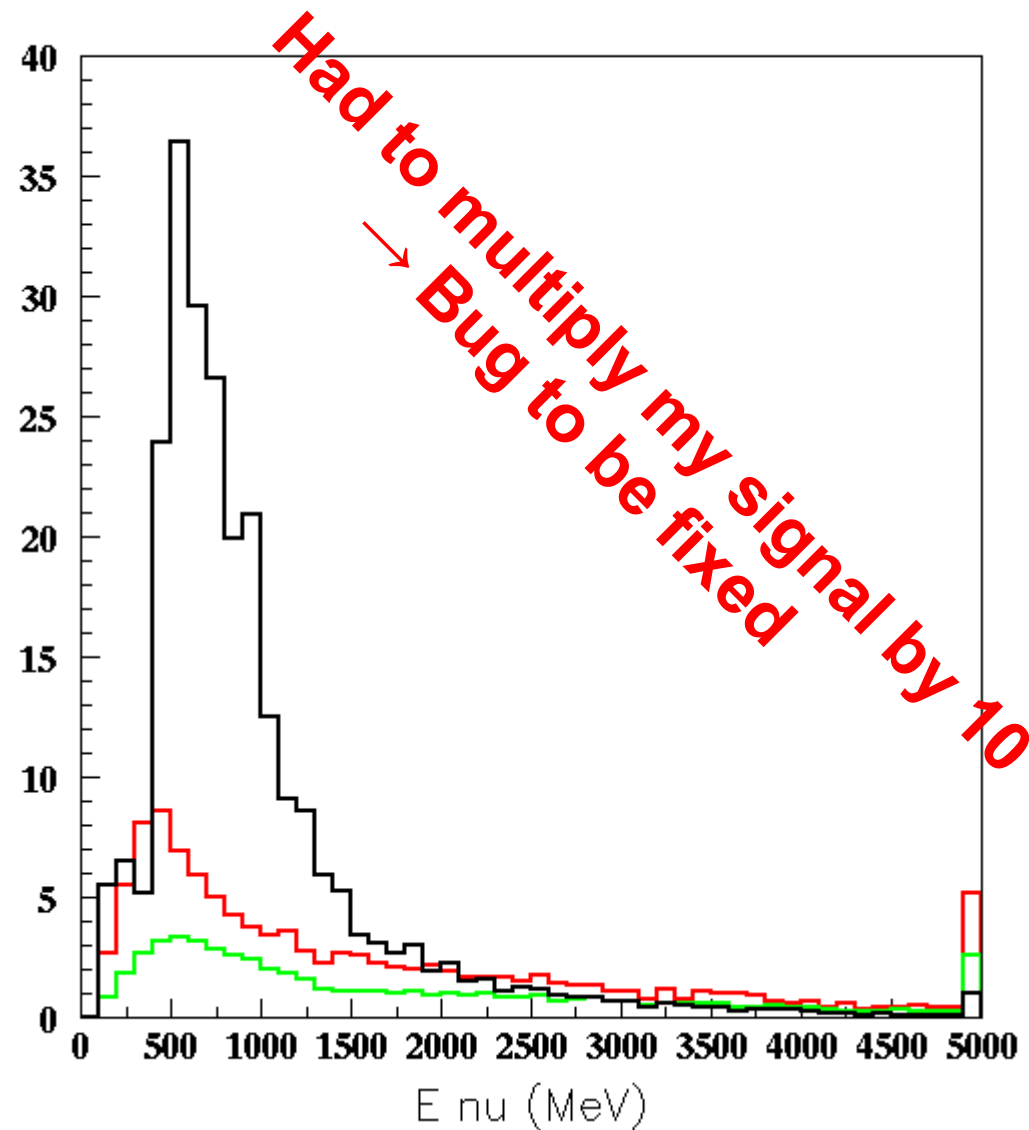
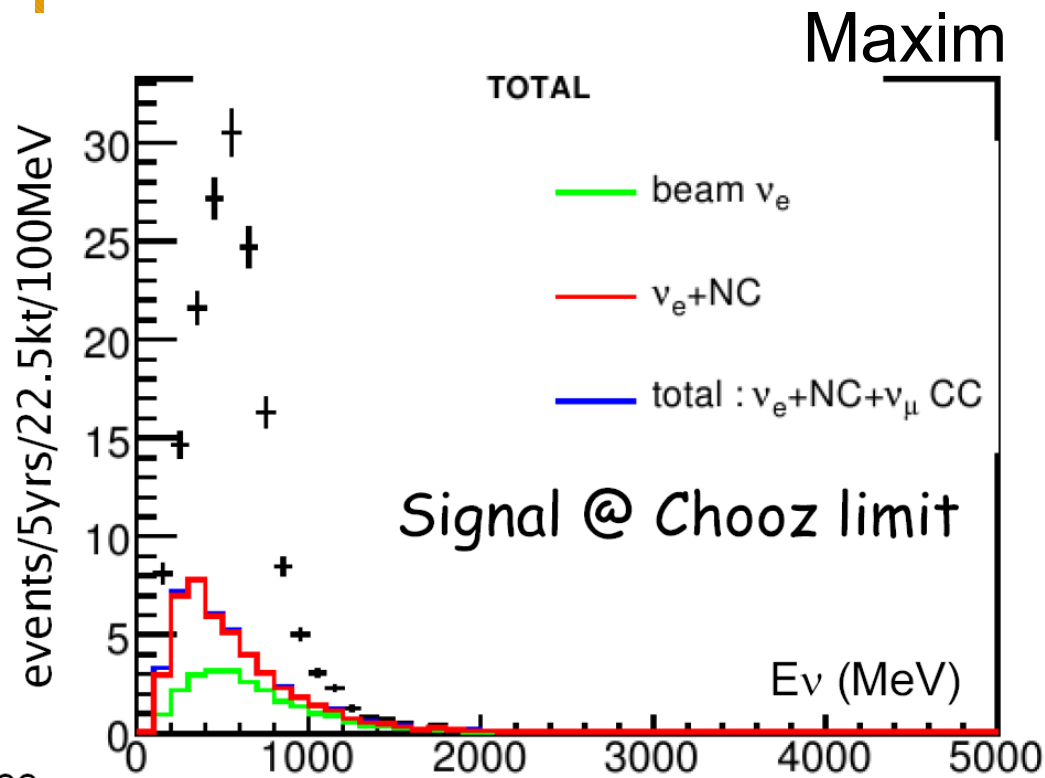
52.8

18.7

Bad → Bug! Probably a normalization problem

# Reproduce Maxim's plots:

I am nearly there, but here also I need to fix a normalization bug



# Summary

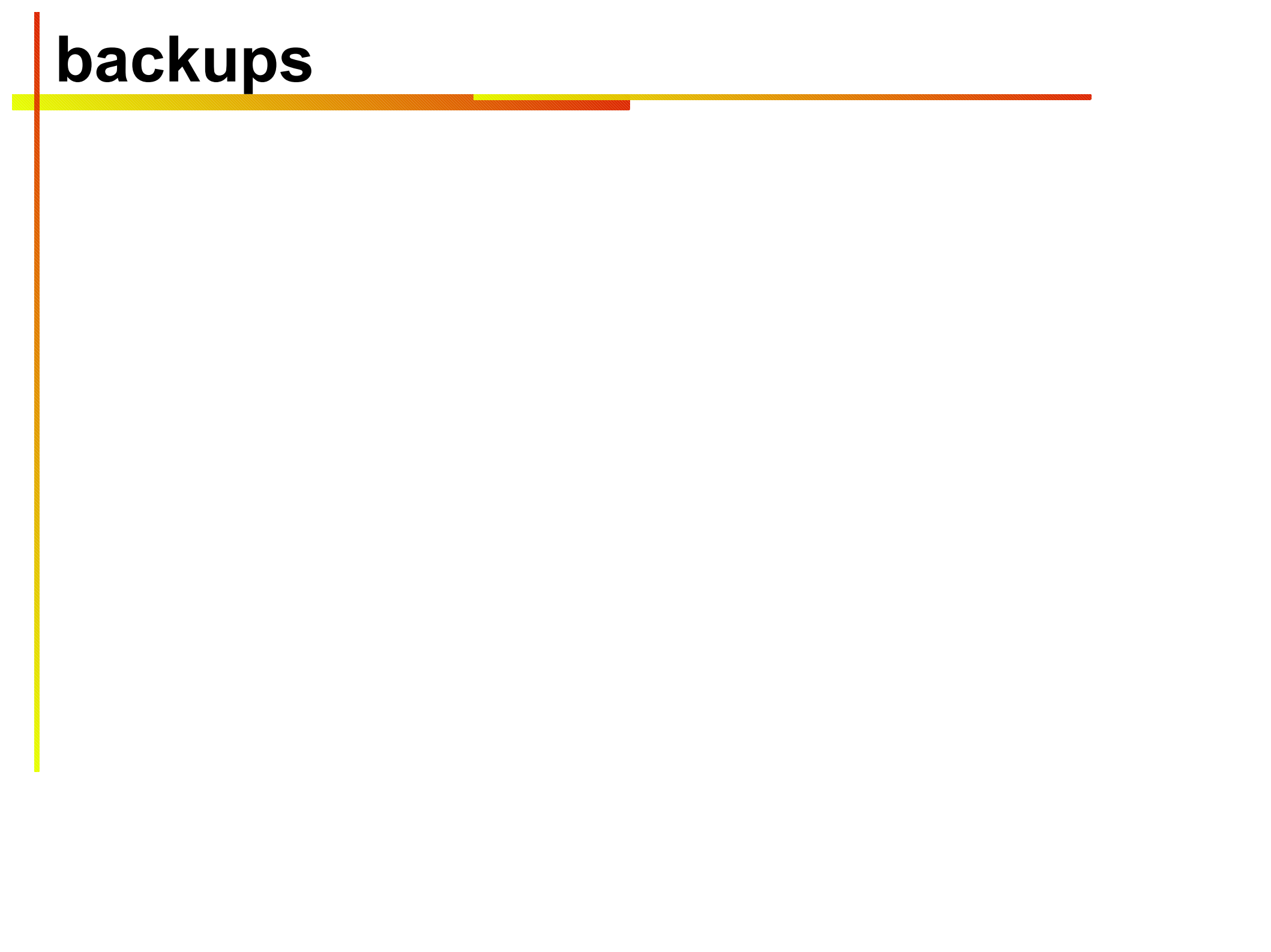


I applied my likelihood analysis to the T2K MC

I still need to fix a few bugs before being able to present real results.



# backups



# table fore ve signal (\*10)

	Signal (chooz)
FC,FV,Evis>100 (MeV)	217.9
Single ring	1843 (84.6%)
E-like	182.2 (83.6%)
No decay e-	166.4 (76.2%)
0.35<E <sub>v</sub> <0.85 (Gev)	127.2 (58.3%)
Cosθ <sub>νlepton</sub> <0.9	111.4 (51.1%)
Polfit M <sub>γγ</sub> < 100 MeV/c <sup>2</sup>	94.1 (43.2%)
ΔlogLikelihood < 80	91.9 (42.2%)

Nu-e CC Signal

fcfv	35.7	308.0	191.8	102.2
1ring	18.7	177.9	101.6	48.3
e-like	18.7	176.6	101.0	48.0
nodecay-e	15.0	155.5	87.3	40.1
likelihood	12.7	127.0	68.4	30.8
efficiency	84.7%	81.7%	78.3%	77.0%