Update on the 2000 Search for Neutrinos from Diffuse Sources

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Review of Cuts Used

Cuts to remove cosmic ray muons:

ldirb > 135

0.3 > smoothness > −0.3

likelihood ratio > 30

Cuts to remove coincident muons:

difference in zenith of best upgoing and downgoing zenith angle > 18 times the difference in ndirc of best upgoing and downgoing fit

ndirb > 5 or likelihood ratio > 41

Cuts to remove unsimulated backgrounds:

cogz < 150

zenith > 100

Results from 20% Analysis

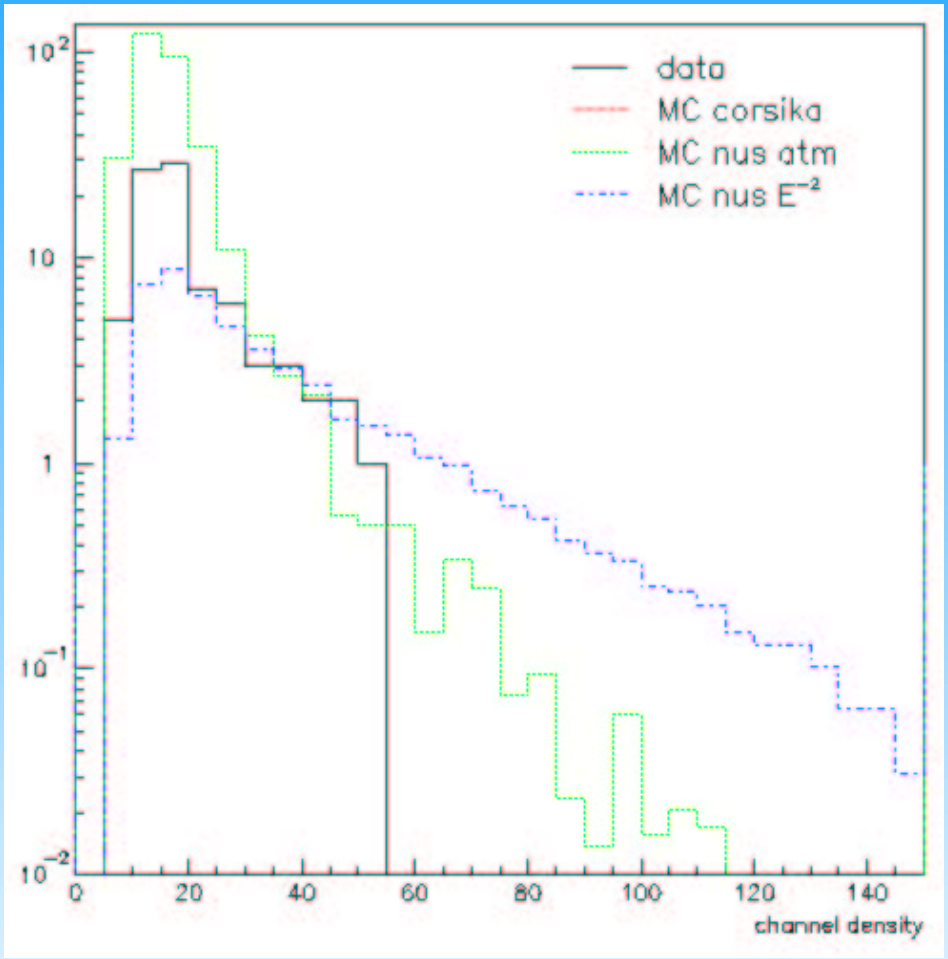
Sensitivity = 8.3 e −7

Best Cut =
channel density > 27

Predicted Signal = 6.38

Predicted Atm. Neutrino
Bkgrd. = 5.23

Number of Data Events
Observed = 12



Results from 50% Analysis

Sensitivity = 3.8 e −7

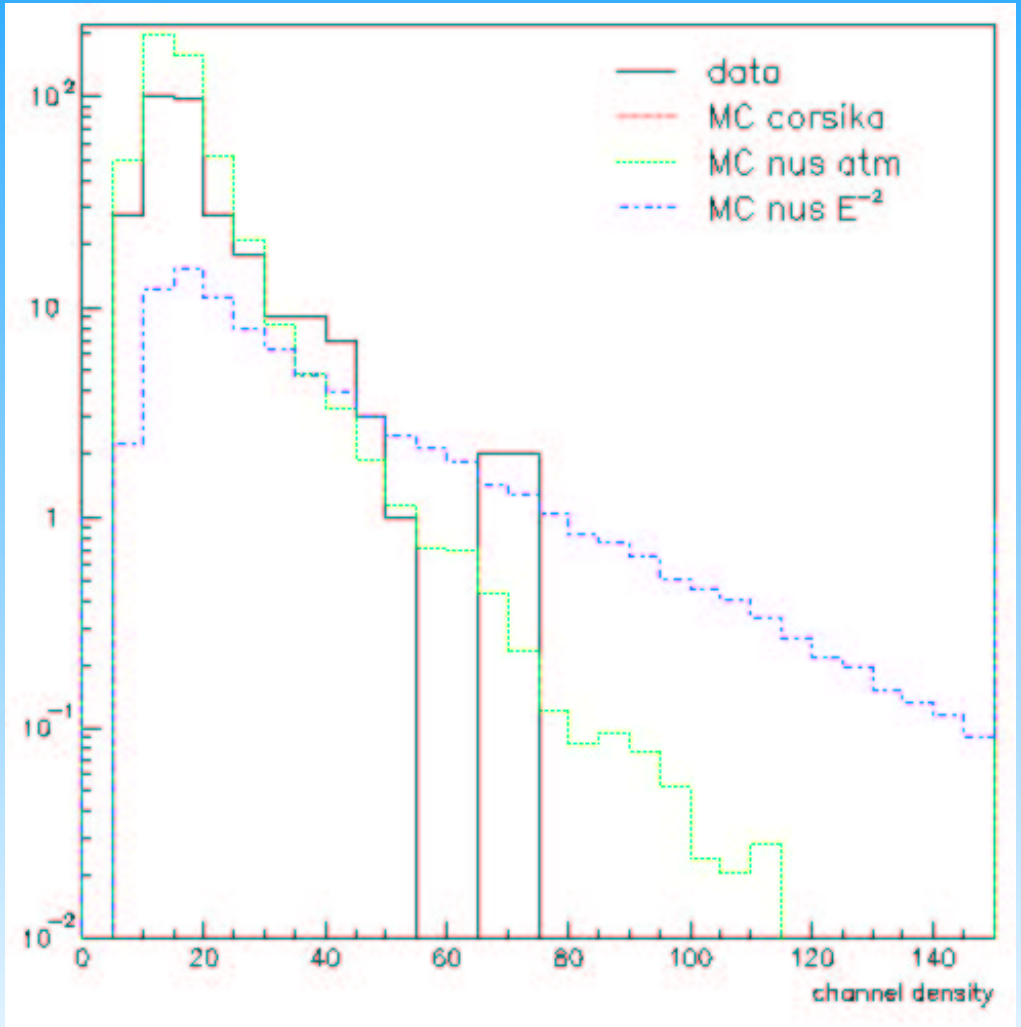
Best Cut =
channel density > 30

Predicted Signal = 20.5

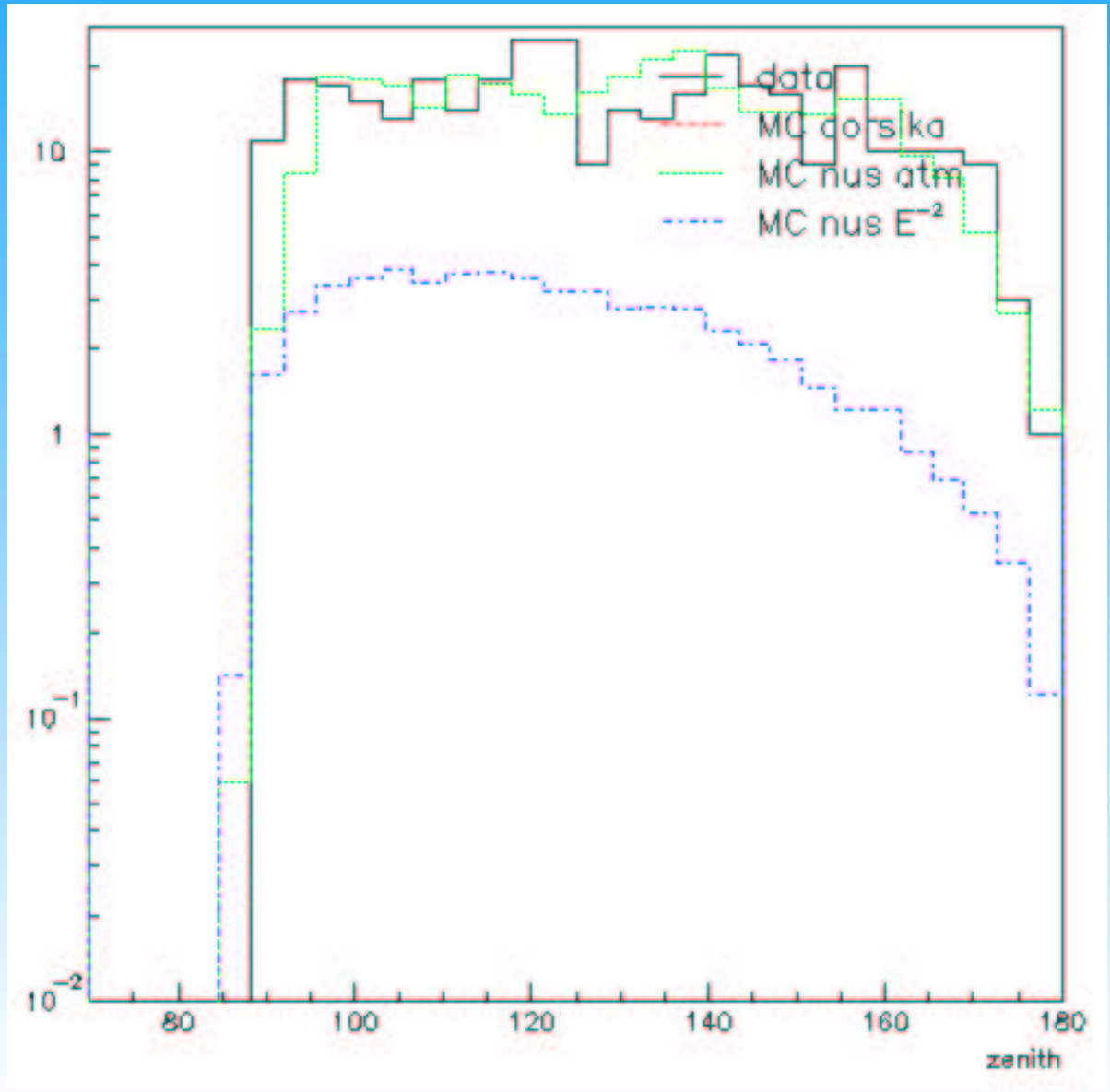
Predicted Atm. Neutrino Bkgrd. = 13.4

Number of Events in Data Sample = 30

From Scanning: 25 look really good, 2 look okay, and 3 are not so convincing.



Zenith Angle Distrubution for 50% Sample



Zenith Dependent Significance

Zenith	Sensitivity	Events Obs.	Atm. Bkgrd.	Sig
100	3.80E−007	30	13.5	4.5
105	4.20E−007	25	11.3	4.1
110	4.50E−007	22	9.6	4
115	5.30E−007	19	7.59	4

Note: The zenith cut changes from chden > 30 to chden > 27 at a zenith cut of 120 according to the model rejection factor.

Hold On the Story's Not Over

- Need more horizontal muon Monte Carlo. This will enable us to figure out at what zenith cut we can be reasonably certain that no background due to cosmic rays is leaking into the analysis.
- Need to figure out the normalization problem. For 20% data the normalization factor was 0.59 (multiply predicted fluxes by 0.59) and for 50% analysis it was found to be 0.89.
- And of course, we must check every possible explanation for the excess we see before declaring victory.