

# **Extrapolation Cross-Check**

Xiaobo Huang

ANL

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# Files Used and Cuts

- Near data:

near\_data\_L010185N\_cedar\_phy\_bhcurv\_SUN\_mcnn

- Near MC:

near\_daikon00\_L010185N\_cedar\_phy\_SUN\_mcnn

- Far MC:

far\_beam\_daikon00\_L010185N\_cedar\_phy\_SUN\_mcnn

far\_nue\_daikon00\_L010185N\_cedar\_phy\_SUN\_mcnn

far\_tau\_daikon00\_L010185N\_cedar\_phy\_SUN\_mcnn

- SKZP and default oscillation parameter in far detector
- SKZP in near detector
- HOO and MRCC
- ANN11 > 0.7 or MCNN > 0.83 in the plots

# Files used and Cuts (cont.)

HOO file:

minos/scratch/pawloski/Nue/HornOn\_HornOff/HornOn/macros/MultiCuts/HornOnOff\_15  
PercentBnue\_SPECTRA\_SYST\_ann0.70\_mcnn0.83.root

MRCC file:

/minos/scratch/annah1/SPECTRANEW/SPECTRA\_GAMMA\_ann070\_mcnn083.root

Josh's inputs:

/minos/scratch/boehm/Extrapolation/20081020/Extrap1020/StandardSys/SysHelperFile\_\*

- my code with SKZP & Oscillation for the far detector MC yields exactly the same results w.r.t. Josh's code.

# Selected Far/Near MC Events (ANN2PE>0.7)

near detector

	NC	numu_CC	nue_CC	nuTau_CC	Beam	Nue_CC
Josh	4429	1742				593.1
Xiaobo	4429	1742.2				593.1

far detector

	NC	numu_CC	nue_CC	nuTau_CC	Beam	Nue_CC
Josh	25.6	5.24				2.23
Xiaobo	25.6	5.2				2.2

Near detector normalized to 1e19 POT

Far detector normalized to 3.25e20 POT

# Selected Far/Near MC Events

## (MCNN>0.8)

near detector

	NC	numu_CC	nue_CC	nuTau_CC	Beam	Nue_CC
Josh	2519.8	1088.7				464
Xiaobo	2521.4	1091.1				464.4

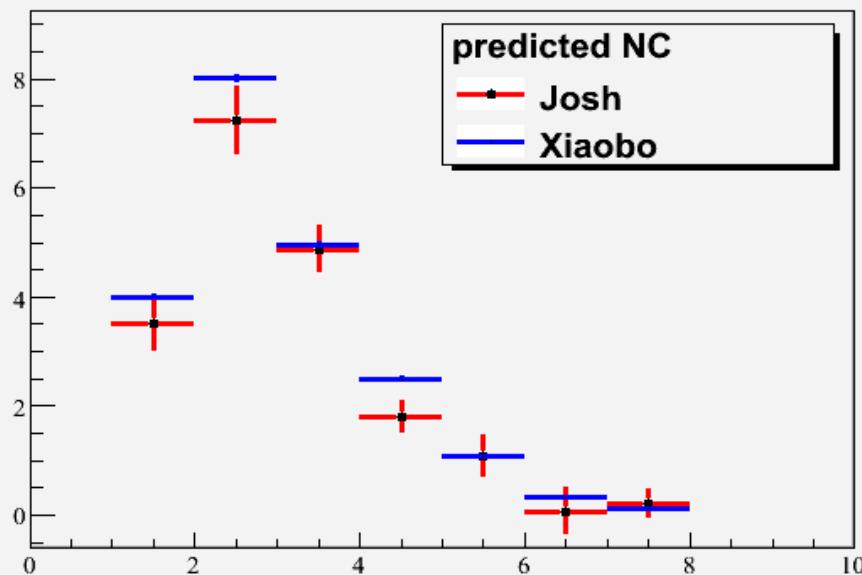
far detector

	NC	numu_CC	nue_CC	nuTau_CC	Beam	Nue_CC
Josh	16.5	3.81				2.23
Xiaobo	16.6	3.8				2.2

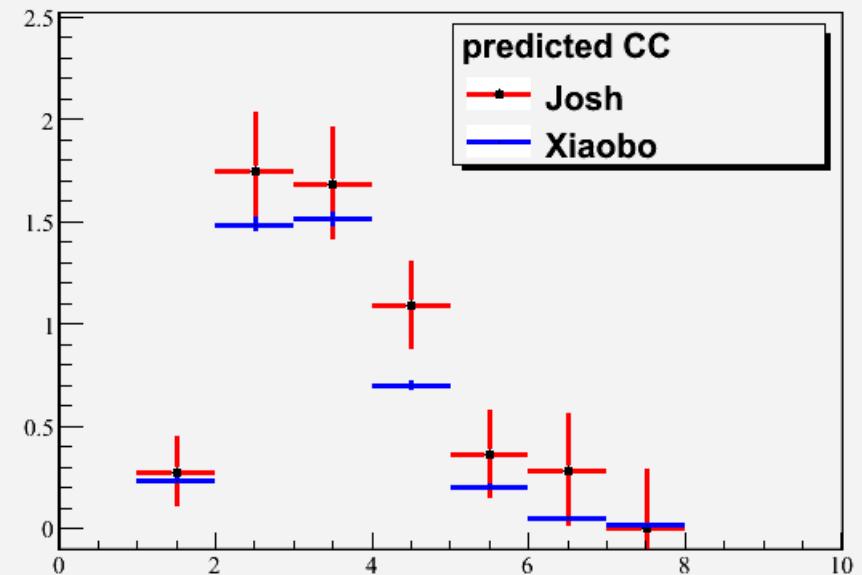
Near detector normalized to 1e19 POT

Far detector normalized to 3.25e20 POT

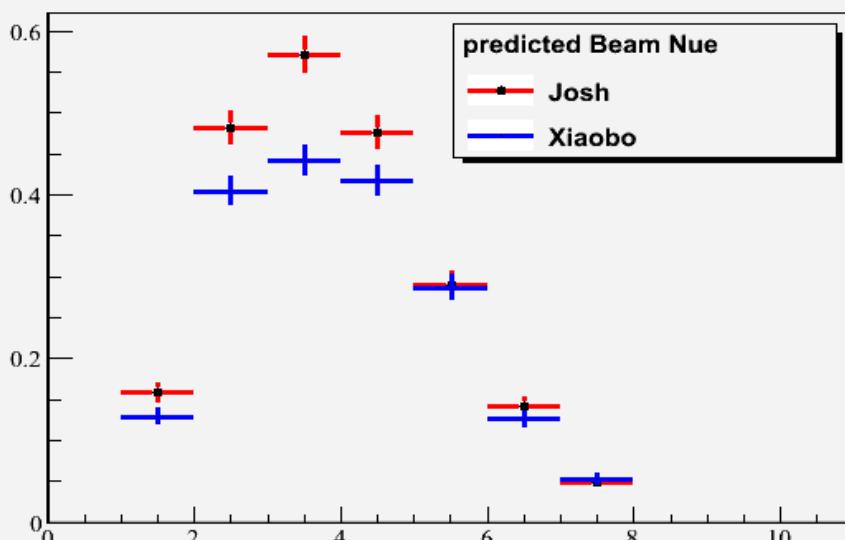
# Far Predictions (ANN & HOO)



FD Reco Energy

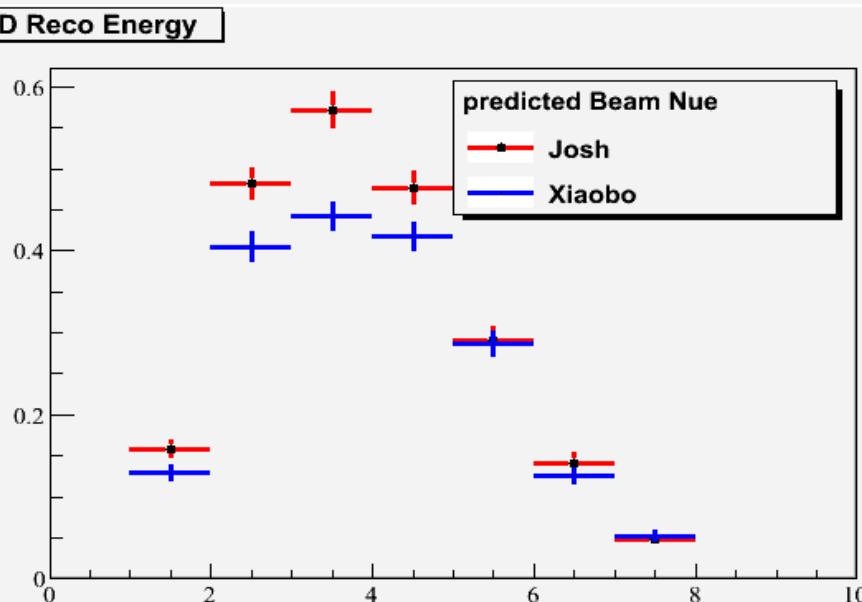
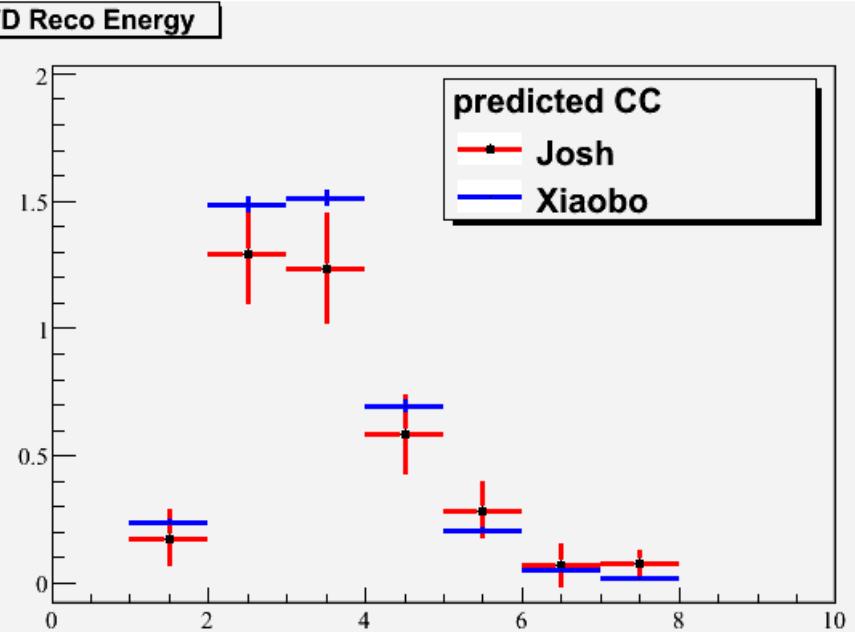
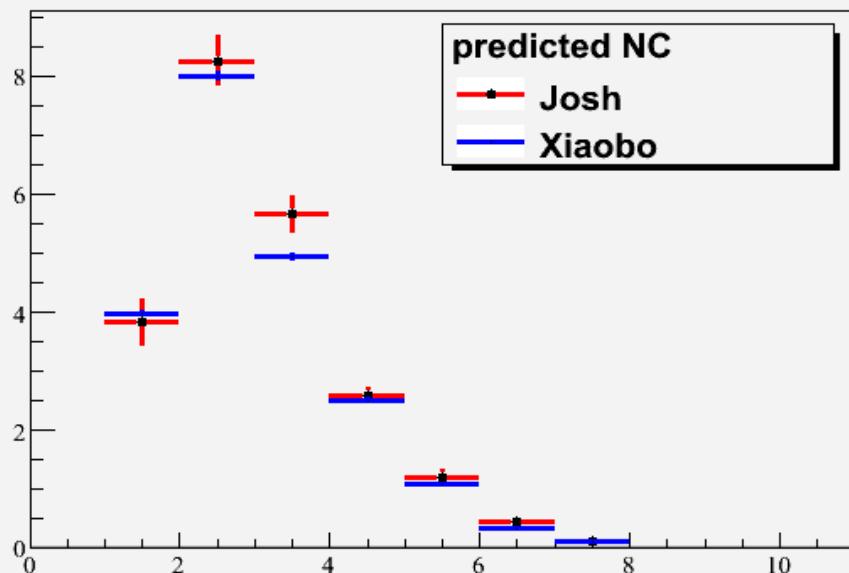


FD Reco Energy



Selected near data (ANN11):  
25172

# Far Predictions (ANN & MRCC)

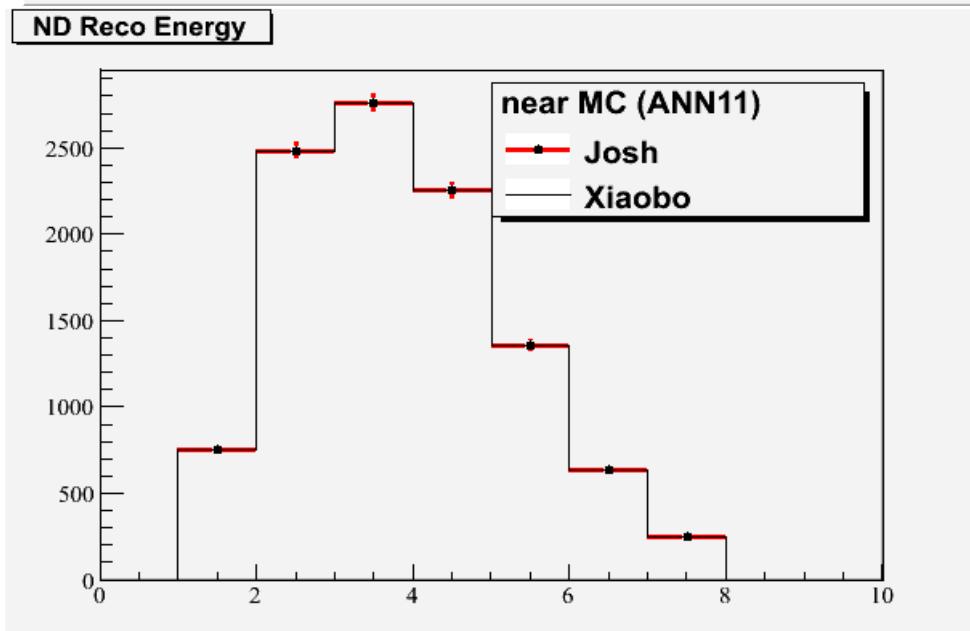
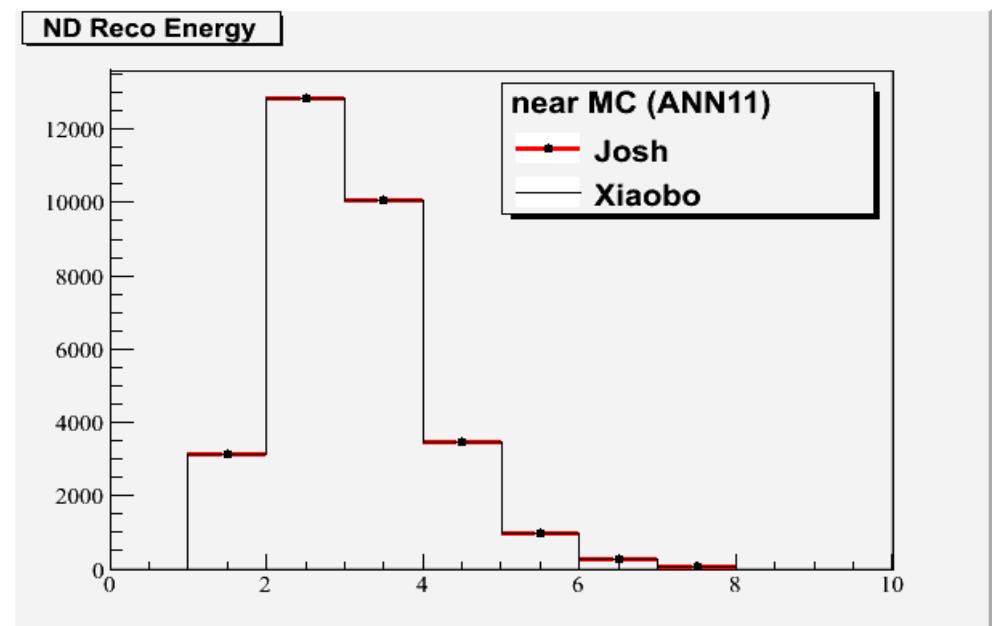
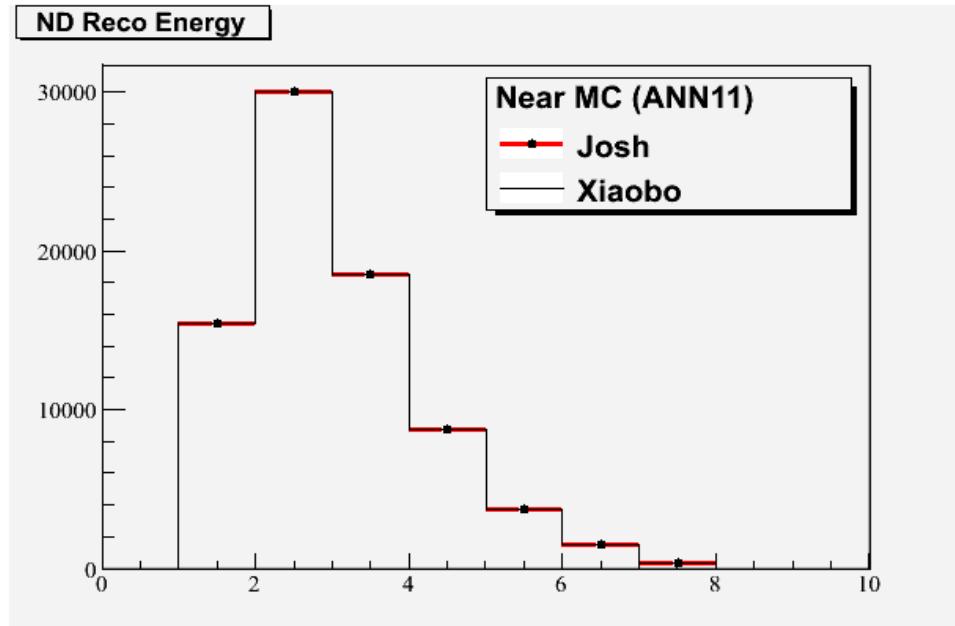


Selected near data (MRCC):  
25172

# What causes this difference?

- To understand the difference in the prediction, a bin by bin (from 0 to 8 GeV) of the input information is performed.
- Only the ANN11 PID will be shown here.

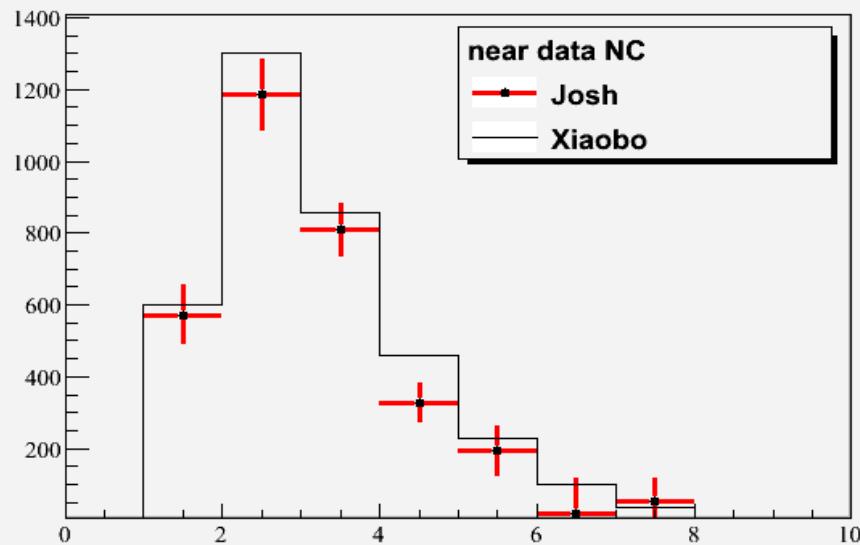
# Comparison by bins (near MC)



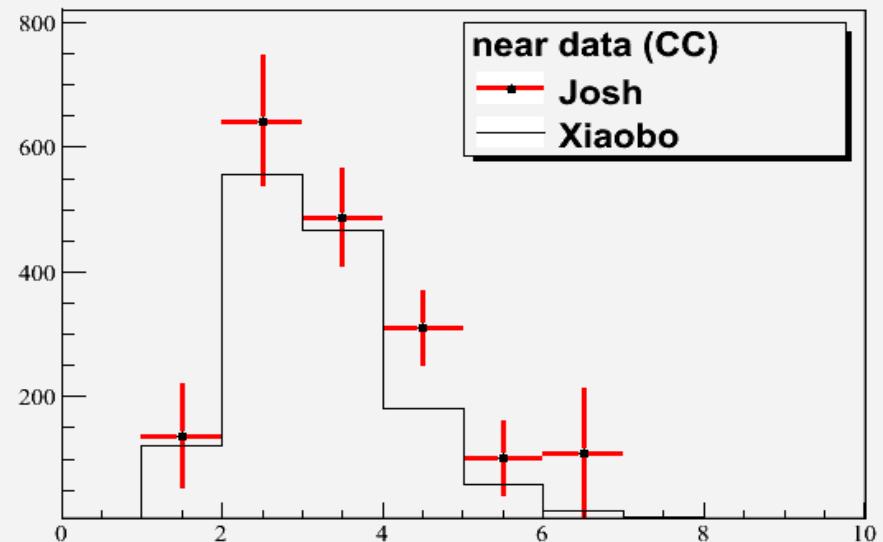
ANN11 for example here.  
The near MC data agree.

# Comparison by bins (near data)

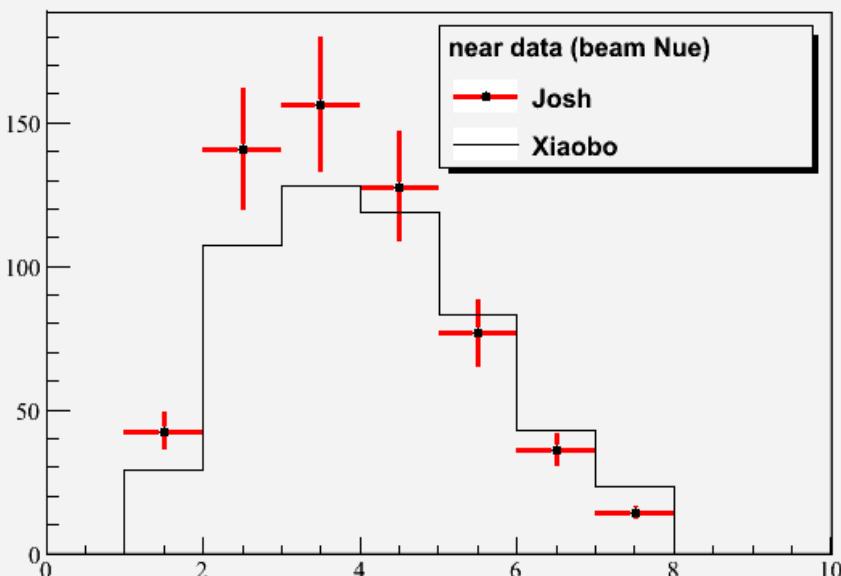
ND Reco Energy



near data (CC)

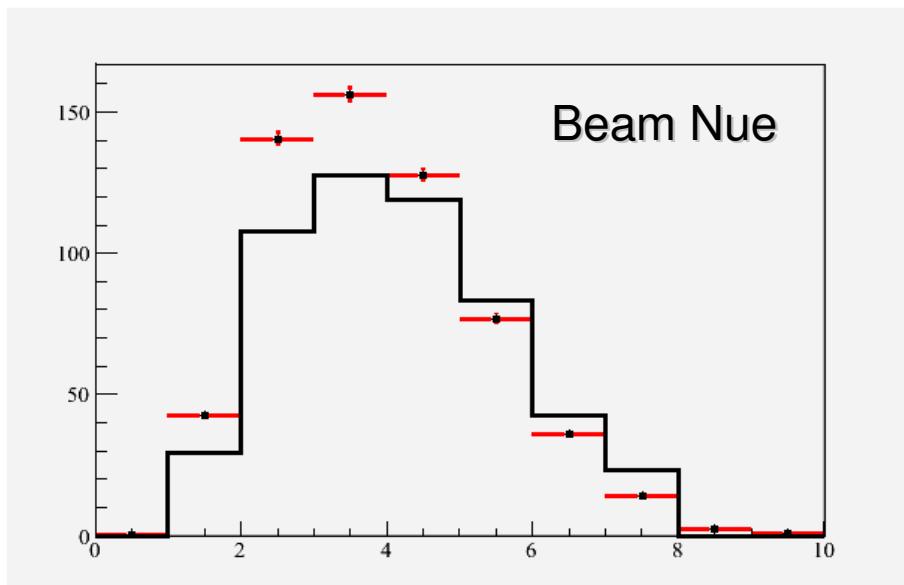
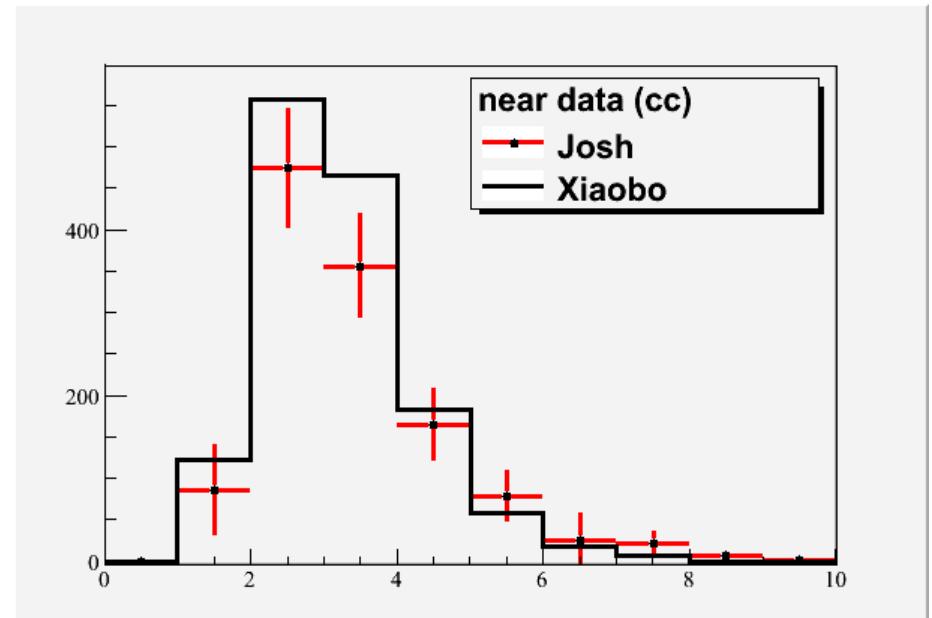
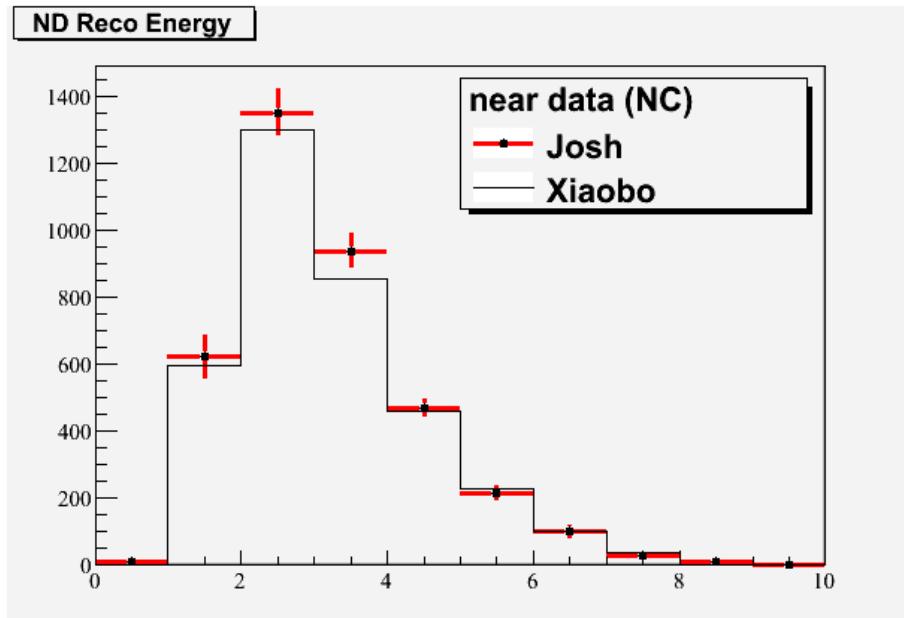


near data (beam Nue)



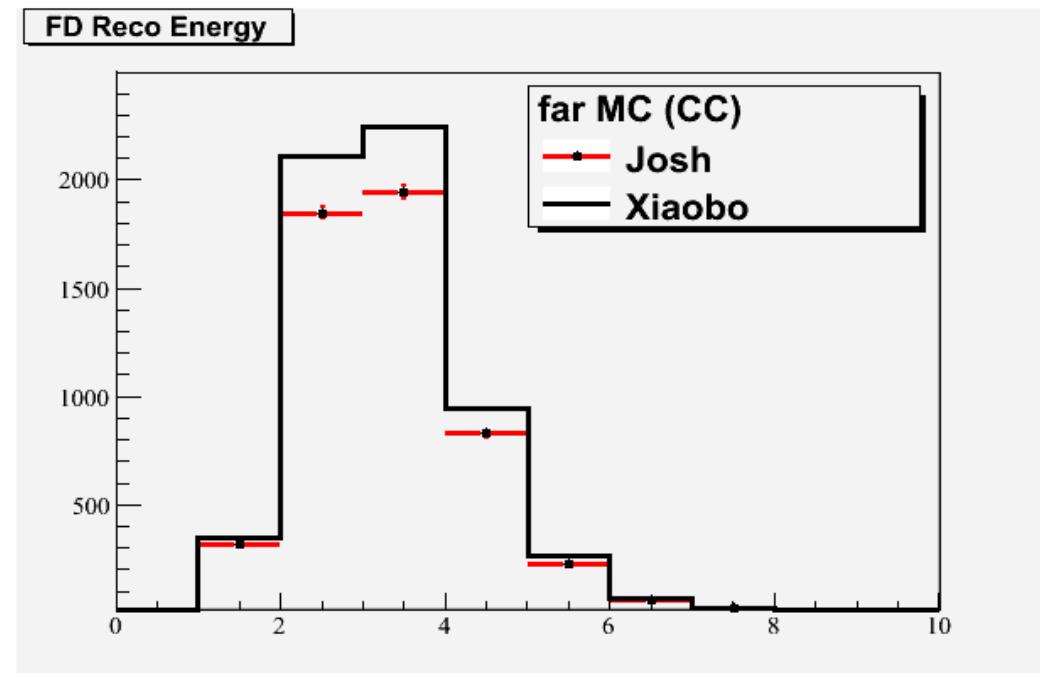
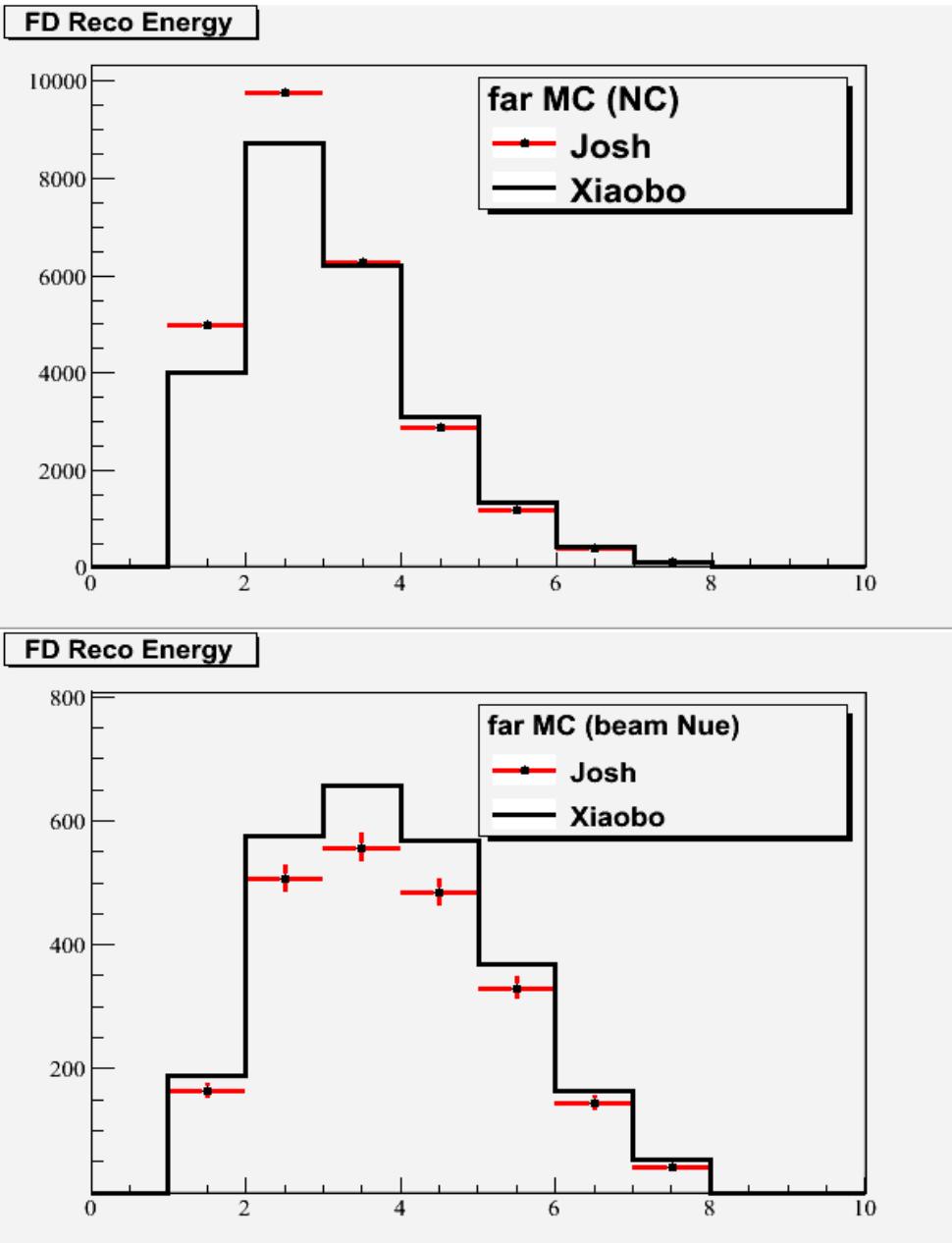
ANN11 & HOO

# Comparison by bins (near data)



ANN11 & MRCC

# Comparison by bins (far MC)



Far detector ANN11

# Discussion

bin by bin comparison:

Near data: same HOO and MRCC but different results

Near MC: agree

Far MC: some difference, but my code and Josh's code have the same response to a test far MC data file.

- Comparing the same thing?
- I hope that I am wrong.