

GENIE Comparison

Datasets:

miniboone_nuccqe_2010
miniboone_nubarccqe_2013
t2k_nd280_numucc0pi_2015_rps
t2k_nd280_numucc0pi_2015
t2k_nd280_numucc_2013

Models:

master/G18_02a_00_000
RESFix/G18_02a_00_000

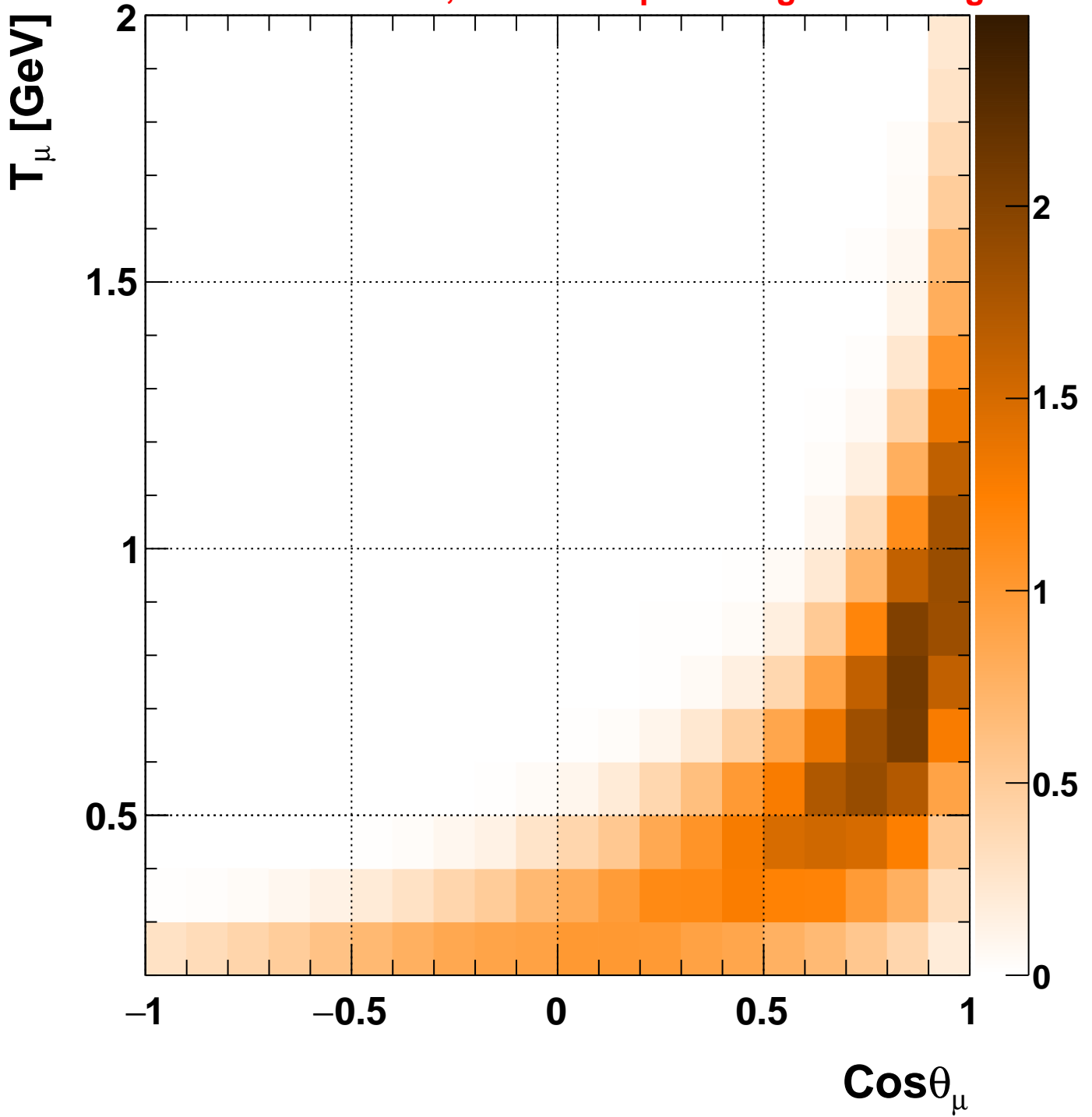
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Dataset:
miniboone_nuccqe_2010

Models:
master/G18_02a_00_000 $\chi^2 = 669 / 137$ DoF
RESFix/G18_02a_00_000 $\chi^2 = 650 / 137$ DoF

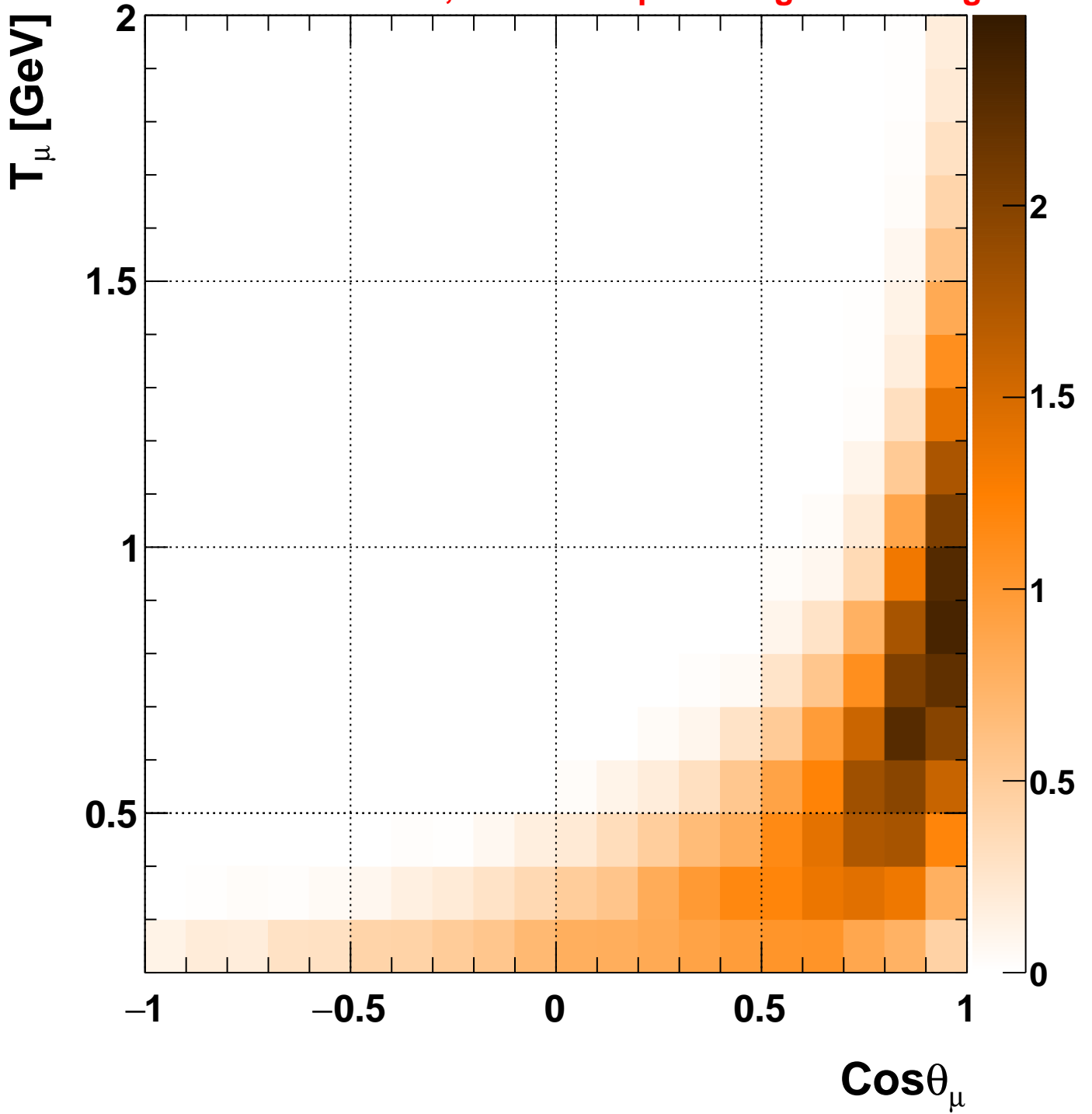
Plot:
 $\partial^2 \sigma(\nu_\mu \text{ CC } 0\pi) / \partial \cos\theta_\mu / \partial T_\mu$
137 DoF, $\chi^2 = 669$ **650**

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$\partial^2 \sigma(\nu_\mu \text{ CC } 0\pi) / \partial \text{Cos}\theta_\mu / \partial T_\mu$ [$10^{-38} \text{ cm}^2/\text{GeV/n}$]

Data: miniboone_nuccqe_2010



$$\frac{\partial^2 \sigma(\nu_\mu \text{ CC } 0\pi)}{\partial \text{Cos}\theta_\mu \partial T_\mu} [10^{-38} \text{ cm}^2/\text{GeV/n}]$$

Pred: master:G18_02a_00_000:miniboone_fhc

miniboone_nuccqe_2010

VS

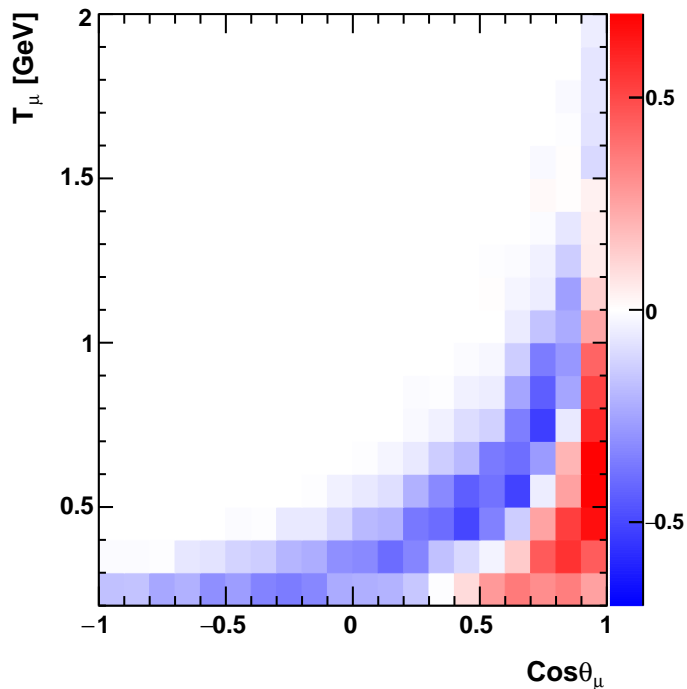
master:G18_02a_00_000:miniboone_fhc

$$\partial^2 \sigma(\nu_\mu \text{ CC } 0\pi) / \partial \text{Cos}\theta_\mu / \partial T_\mu$$

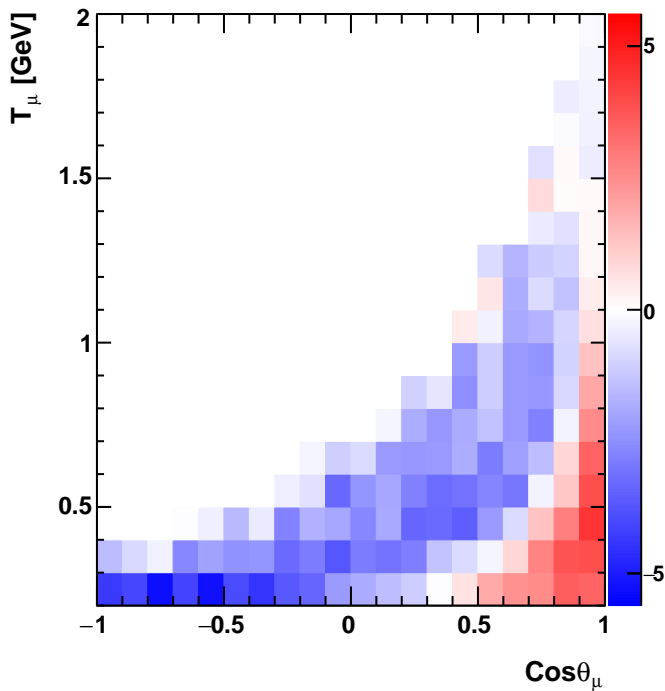
[$10^{-38} \text{ cm}^2/\text{GeV/n}$]

$\chi^2 = 669.095/137 \text{ DoF}$

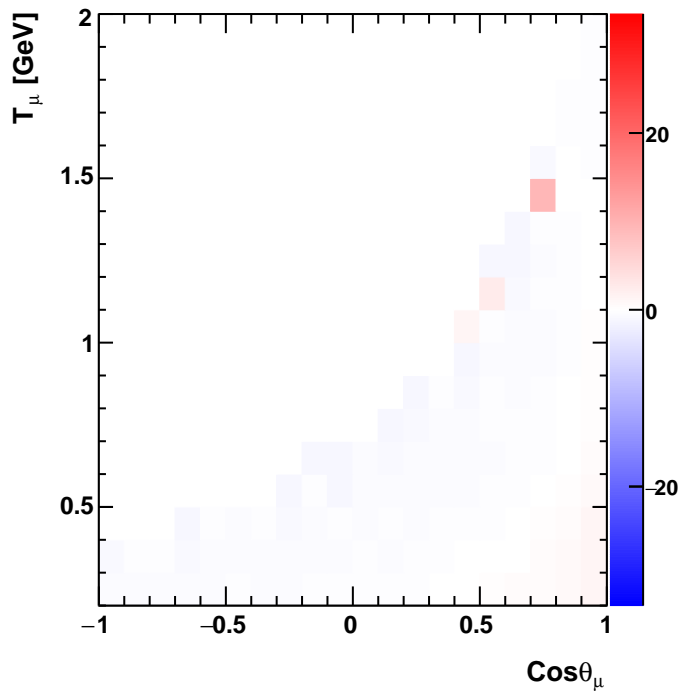
pred - data

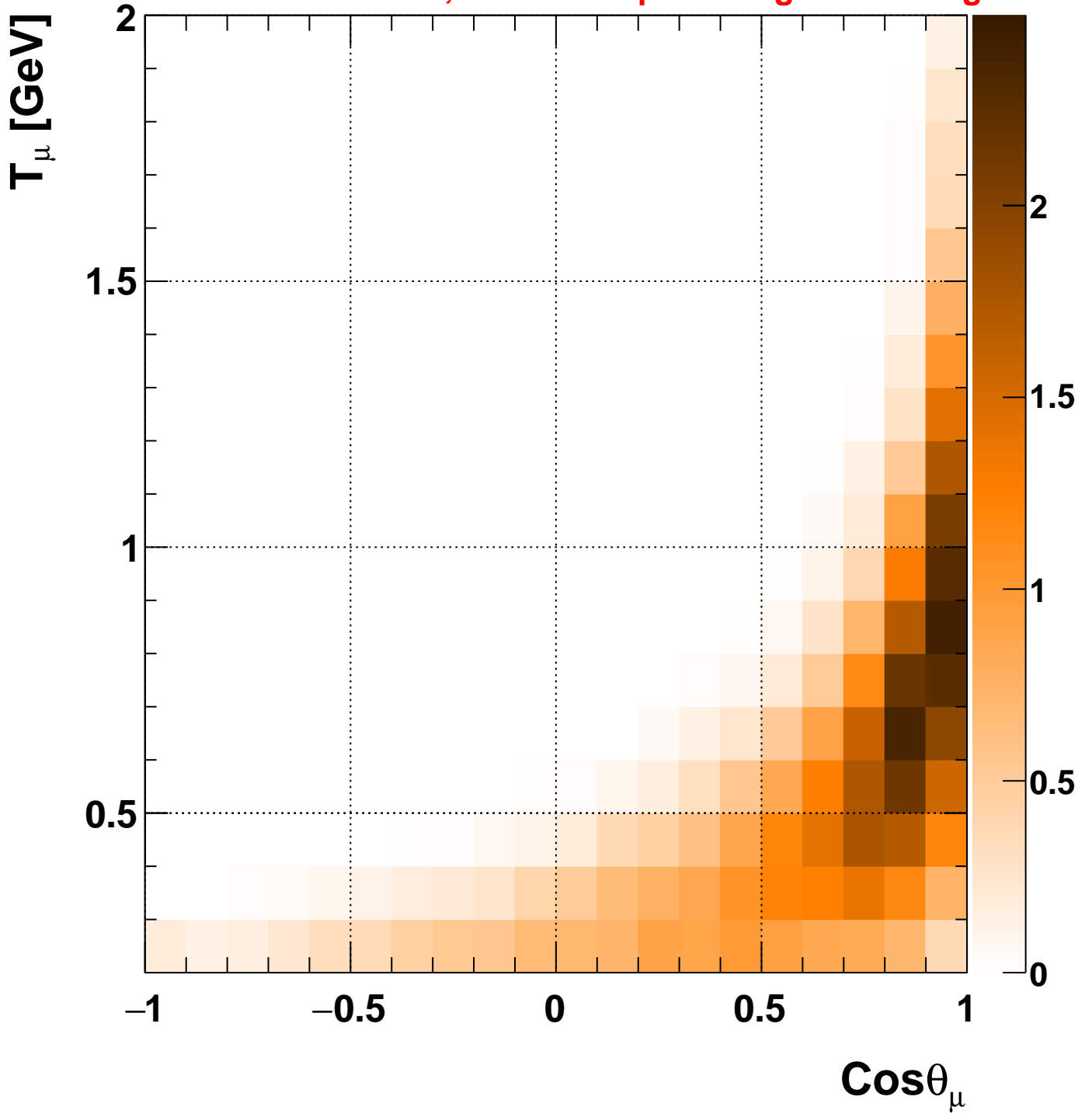


(pred - data)/ σ



(pred - data) / data





$$\frac{\partial^2 \sigma(\nu_\mu \text{ CC } 0\pi)}{\partial \text{Cos}\theta_\mu \partial T_\mu} [10^{-38} \text{ cm}^2/\text{GeV/n}]$$

Pred: RESFix:G18_02a_00_000:miniboone_fhc

miniboone_nuccqe_2010

VS

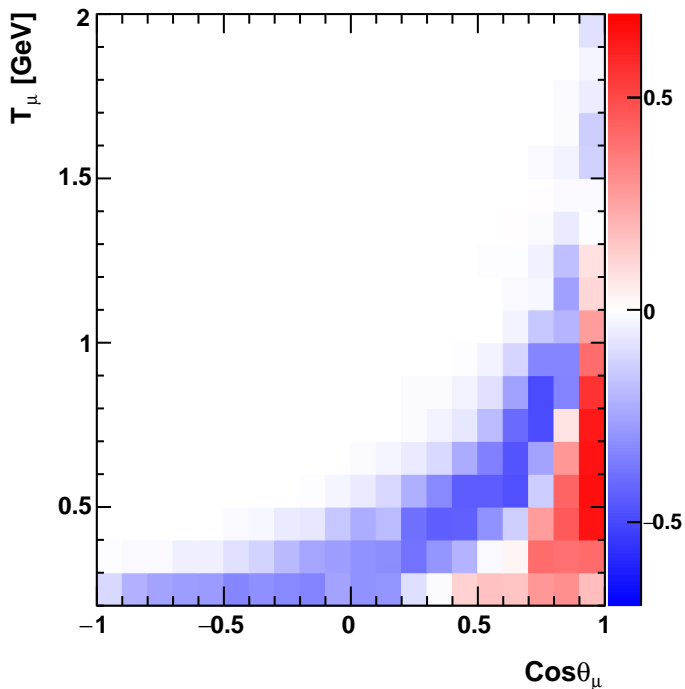
RESFix:G18_02a_00_000:miniboone_fhc

$$\partial^2 \sigma(\nu_\mu \text{ CC } 0\pi) / \partial \text{Cos}\theta_\mu / \partial T_\mu$$

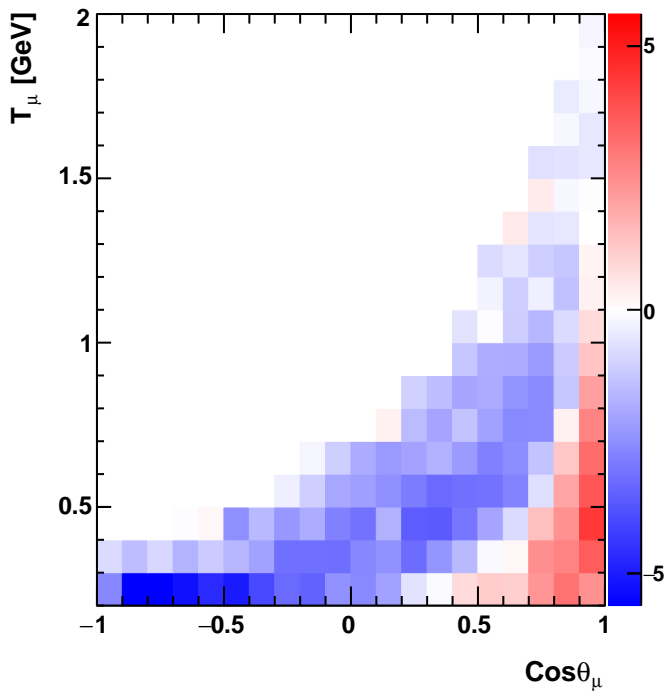
[$10^{-38} \text{ cm}^2/\text{GeV/n}$]

$\chi^2 = 649.539/137 \text{ DoF}$

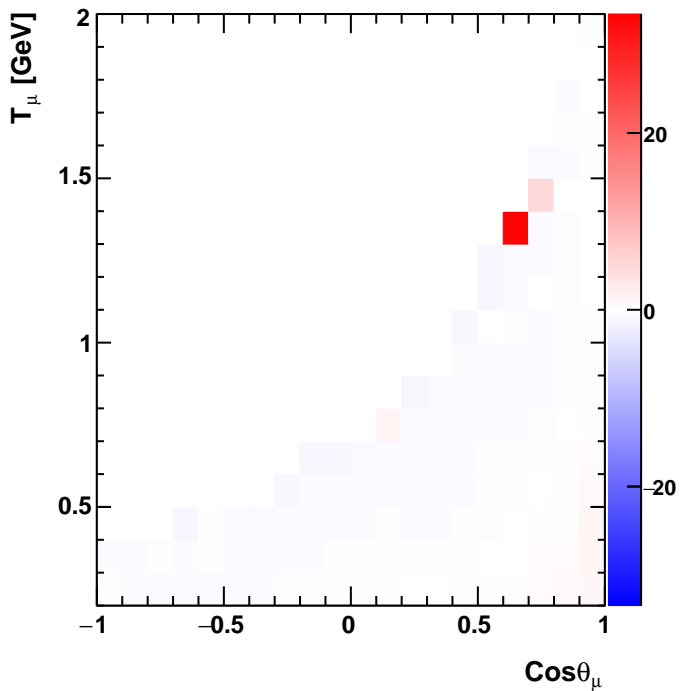
pred - data

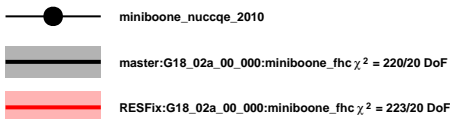
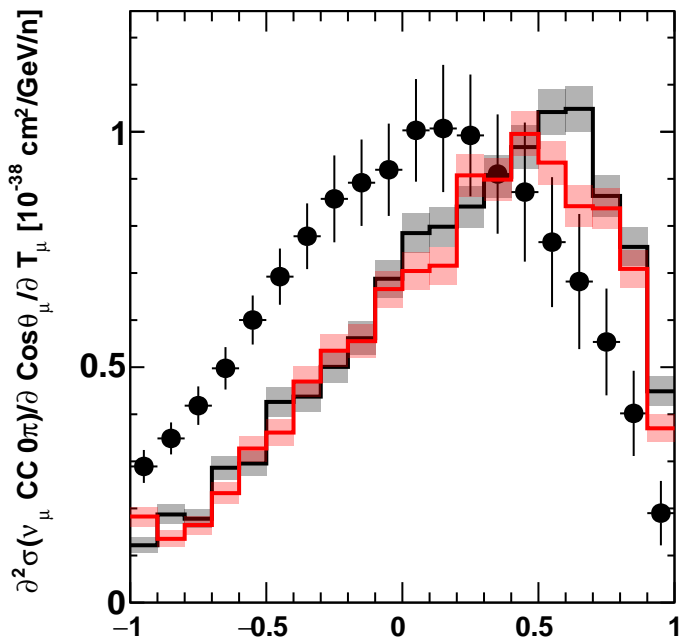
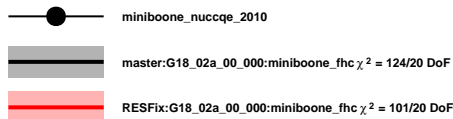
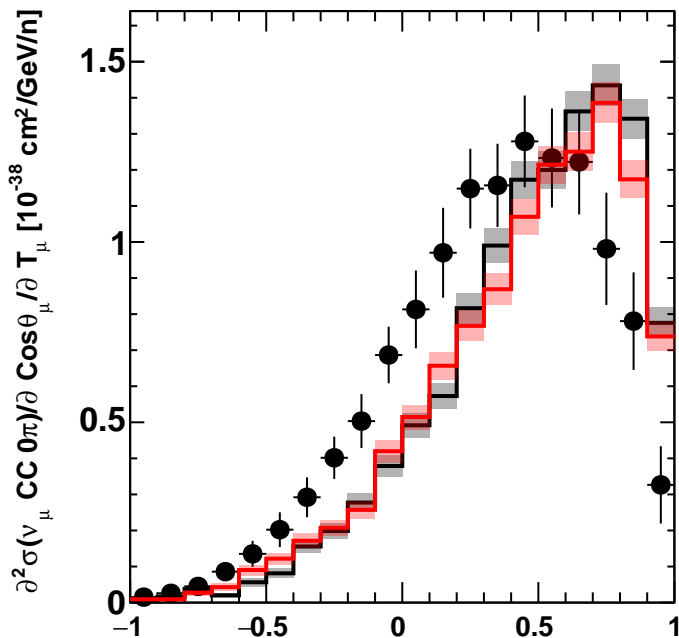
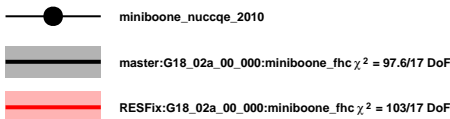
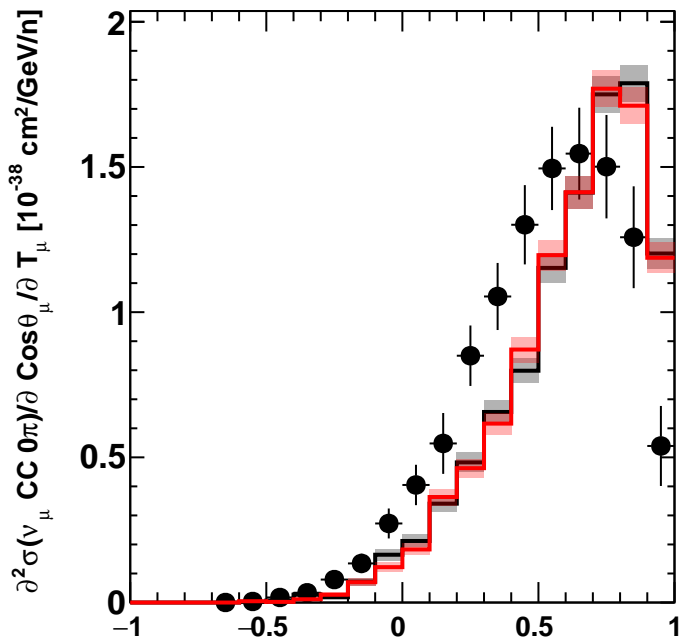
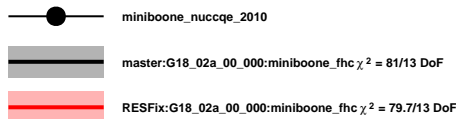
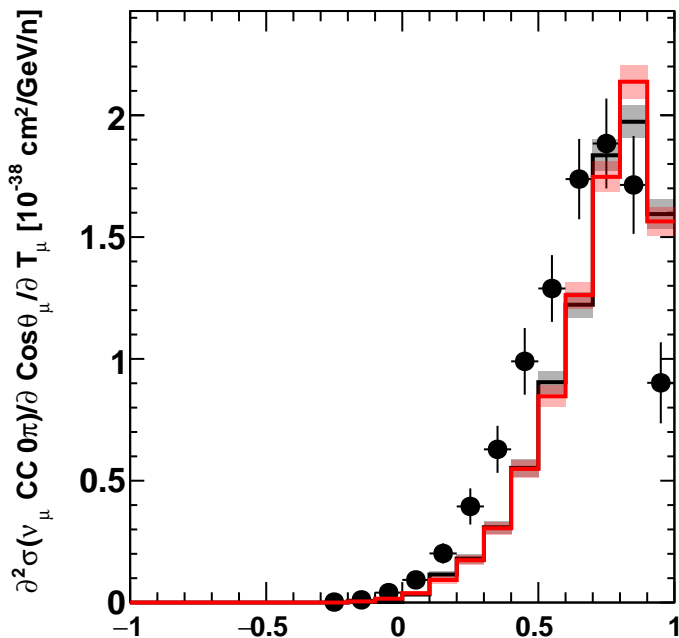


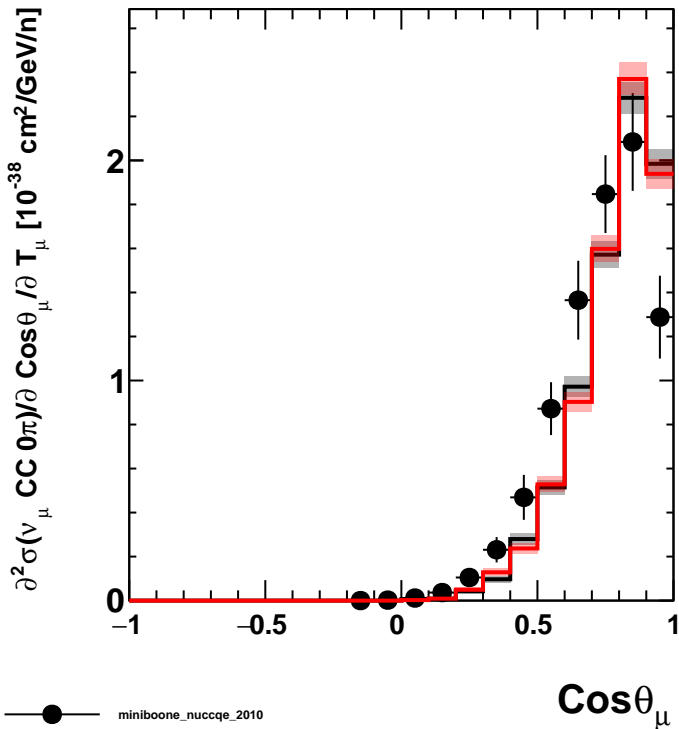
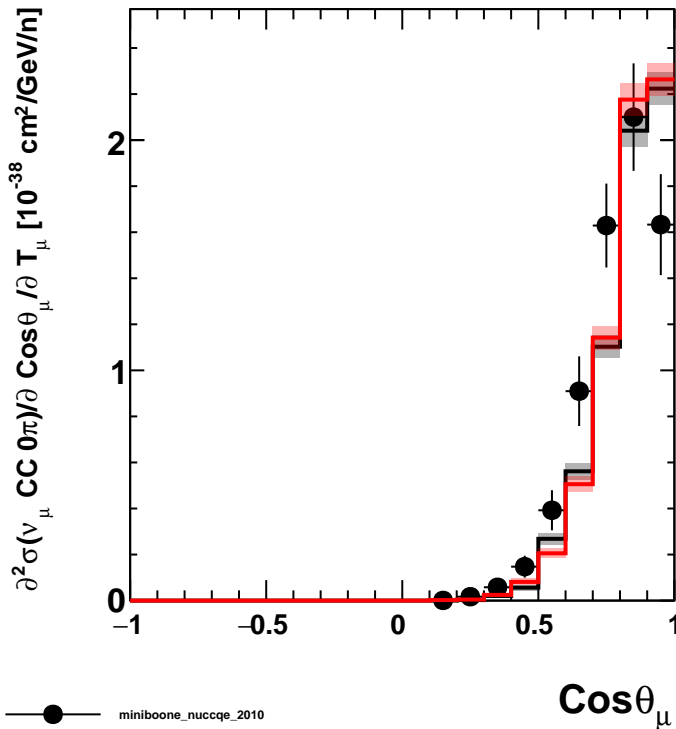
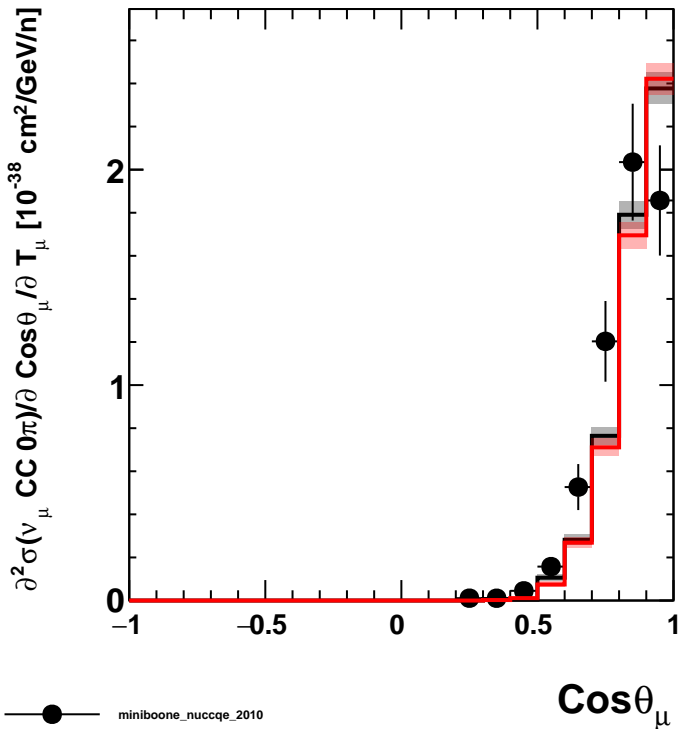
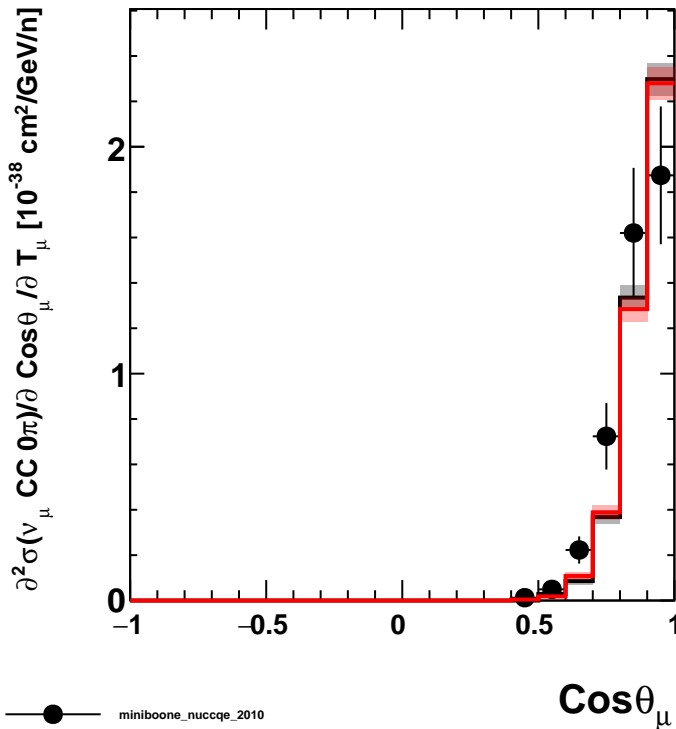
(pred - data)/ σ

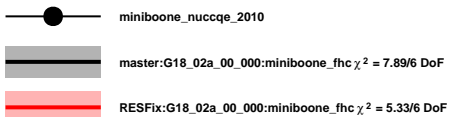
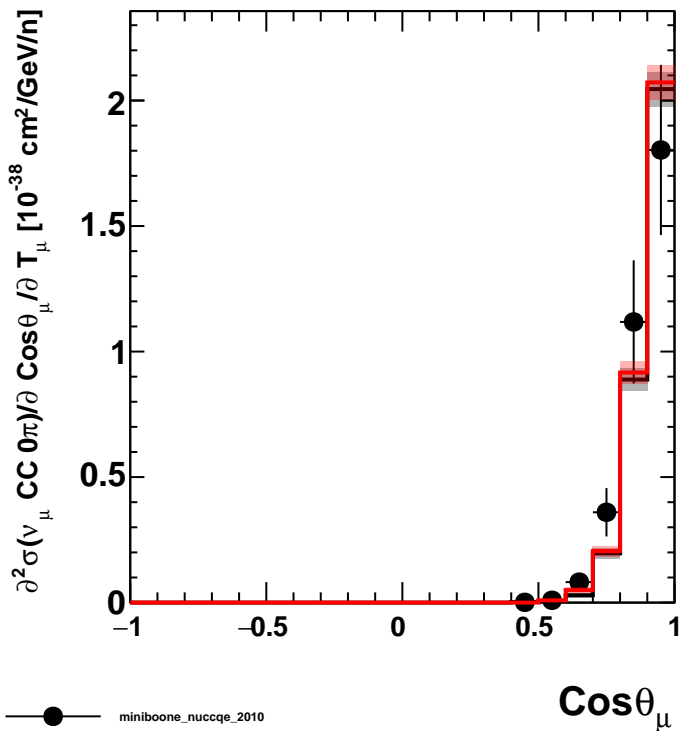
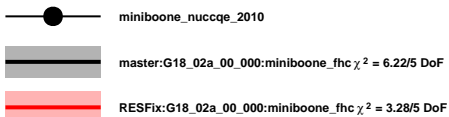
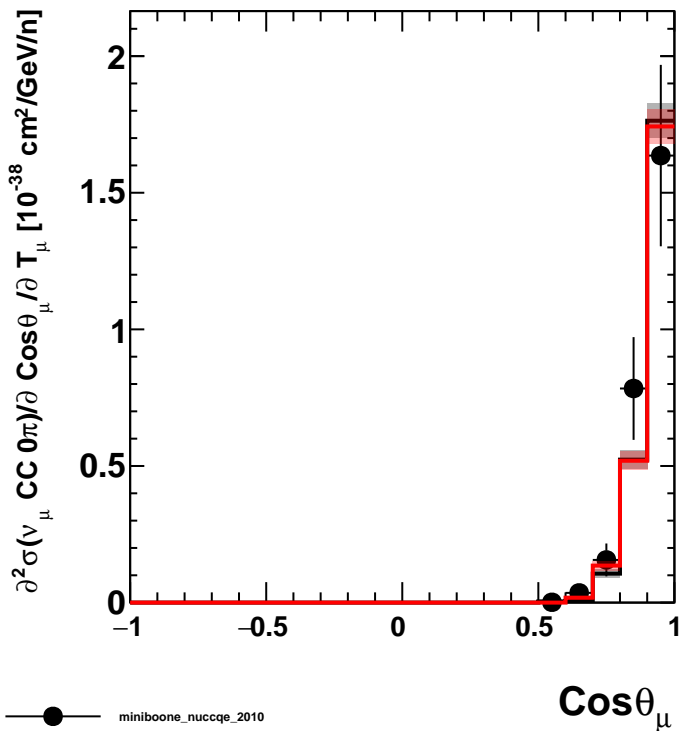
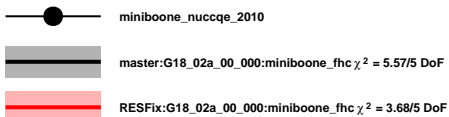
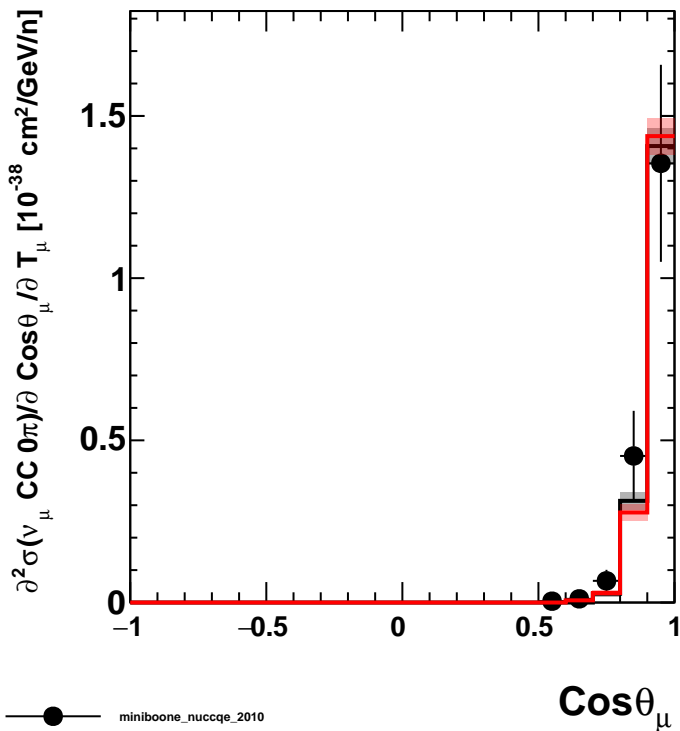
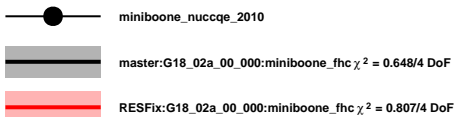
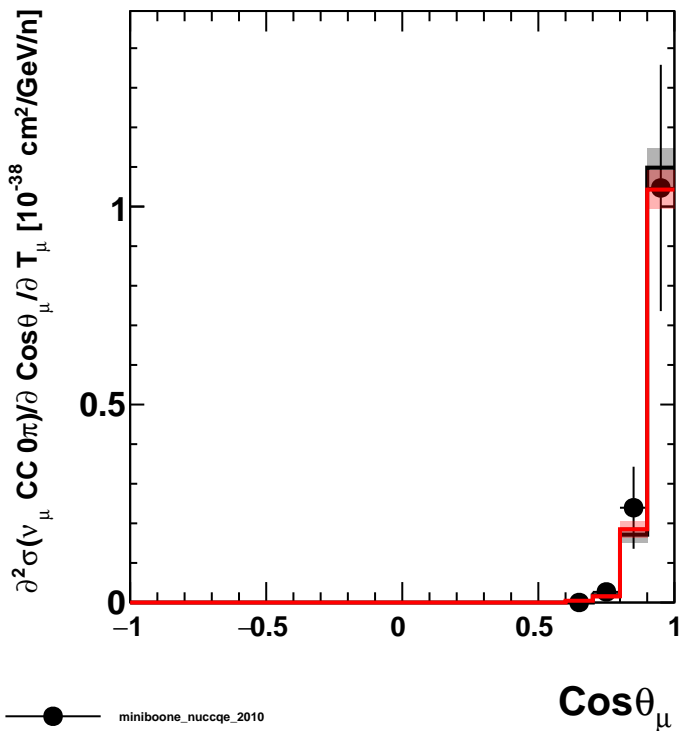


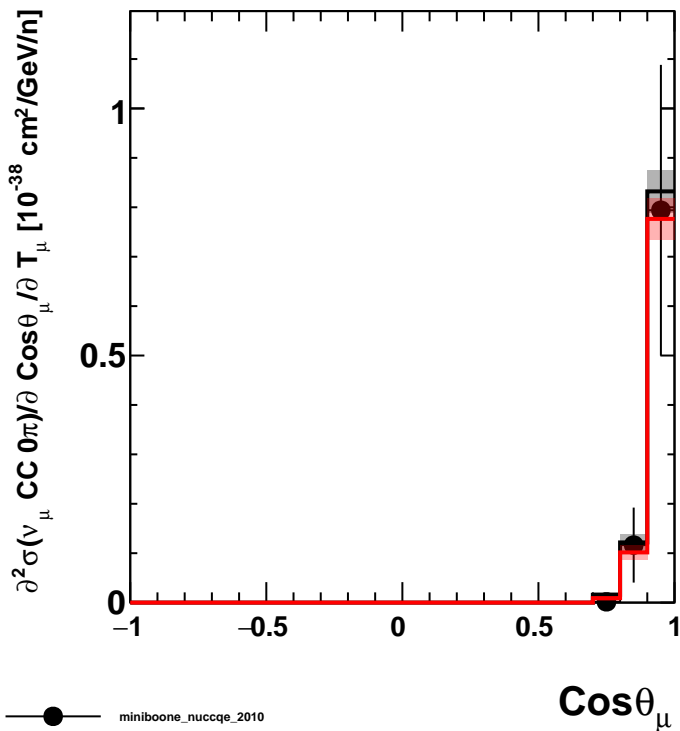
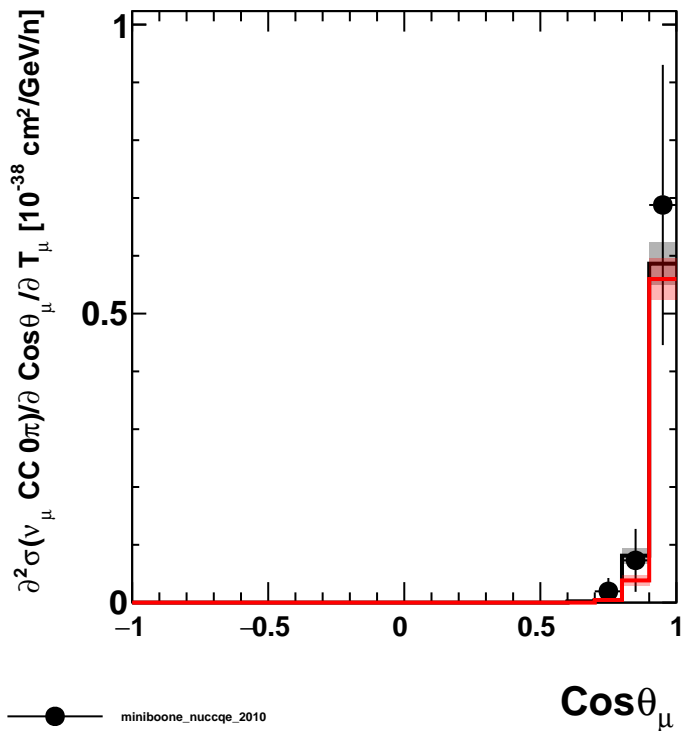
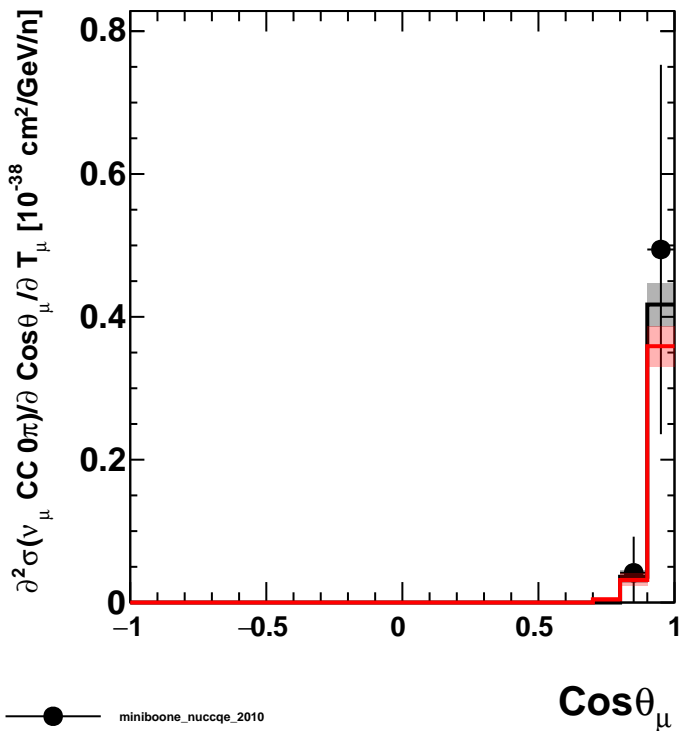
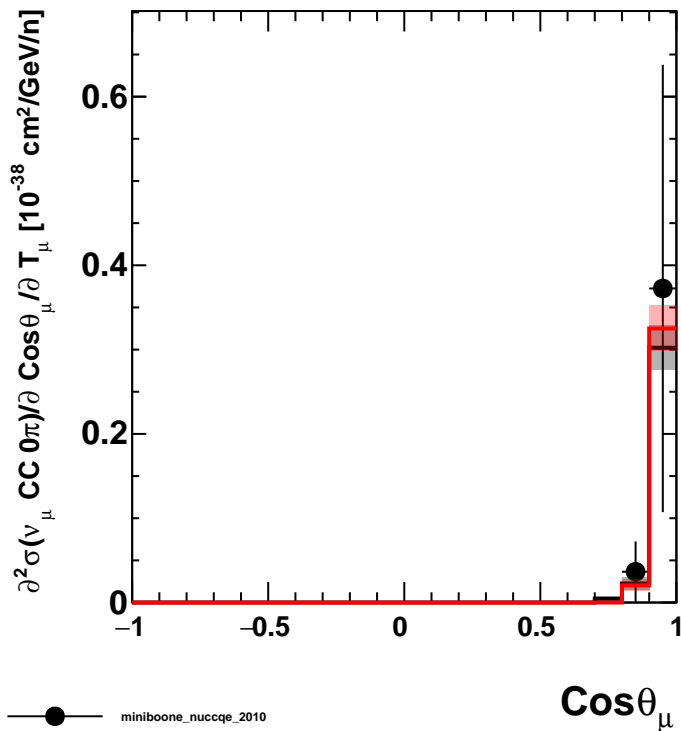
(pred - data) / data



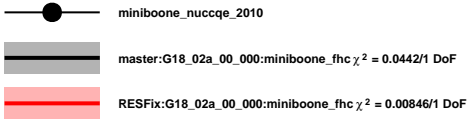
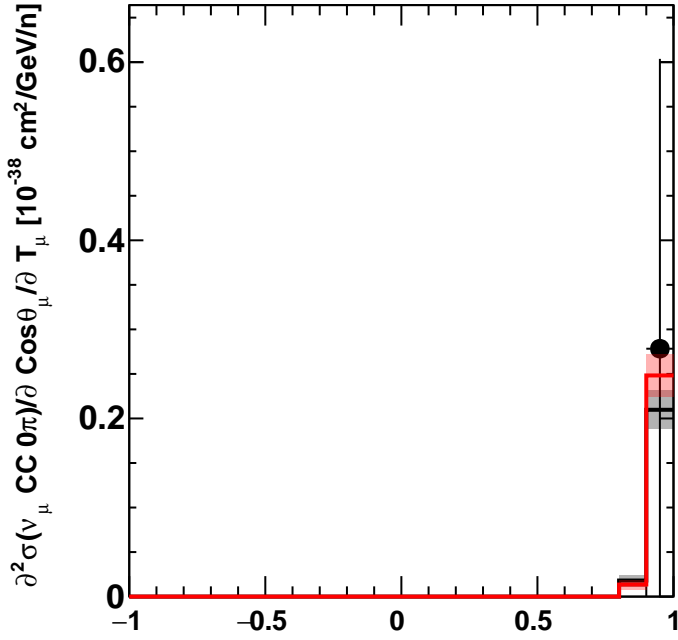
$T_\mu \in [0.2; 0.3] \text{ GeV}$  $\text{Cos}\theta_\mu$ $T_\mu \in [0.3; 0.4] \text{ GeV}$  $\text{Cos}\theta_\mu$ $T_\mu \in [0.4; 0.5] \text{ GeV}$  $\text{Cos}\theta_\mu$ $T_\mu \in [0.5; 0.6] \text{ GeV}$  $\text{Cos}\theta_\mu$

$T_\mu \in [0.6; 0.7] \text{ GeV}$  $T_\mu \in [0.7; 0.8] \text{ GeV}$  $T_\mu \in [0.8; 0.9] \text{ GeV}$  $T_\mu \in [0.9; 1] \text{ GeV}$ 

$T_\mu \in [1; 1.1] \text{ GeV}$  $T_\mu \in [1.1; 1.2] \text{ GeV}$  $T_\mu \in [1.2; 1.3] \text{ GeV}$  $T_\mu \in [1.3; 1.4] \text{ GeV}$ 

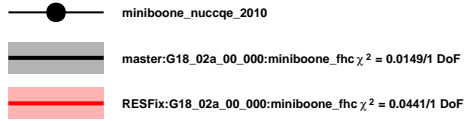
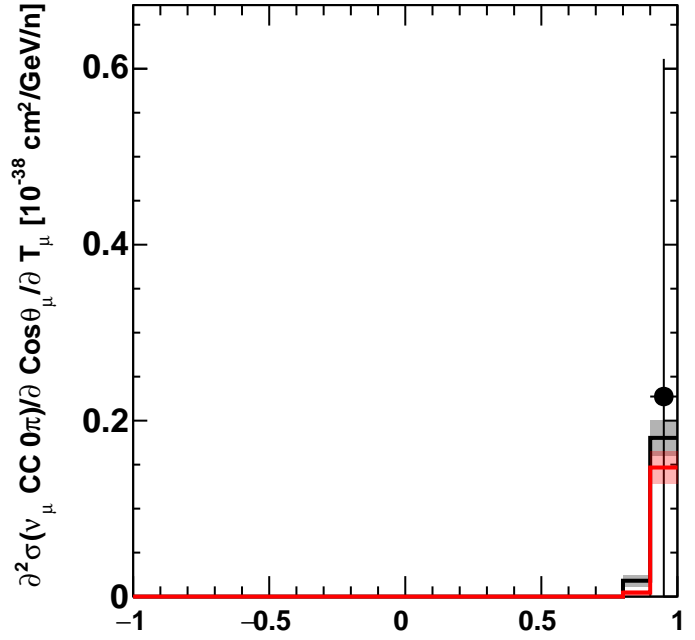
$T_\mu \in [1.4; 1.5] \text{ GeV}$  $T_\mu \in [1.5; 1.6] \text{ GeV}$  $T_\mu \in [1.6; 1.7] \text{ GeV}$  $T_\mu \in [1.7; 1.8] \text{ GeV}$ 

$T_\mu \in [1.8; 1.9] \text{ GeV}$

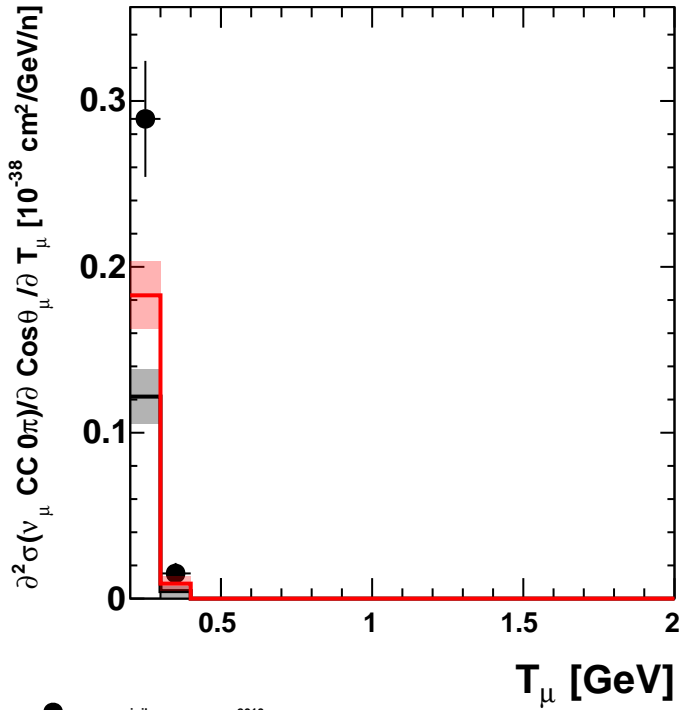


$\text{Cos}\theta_\mu$

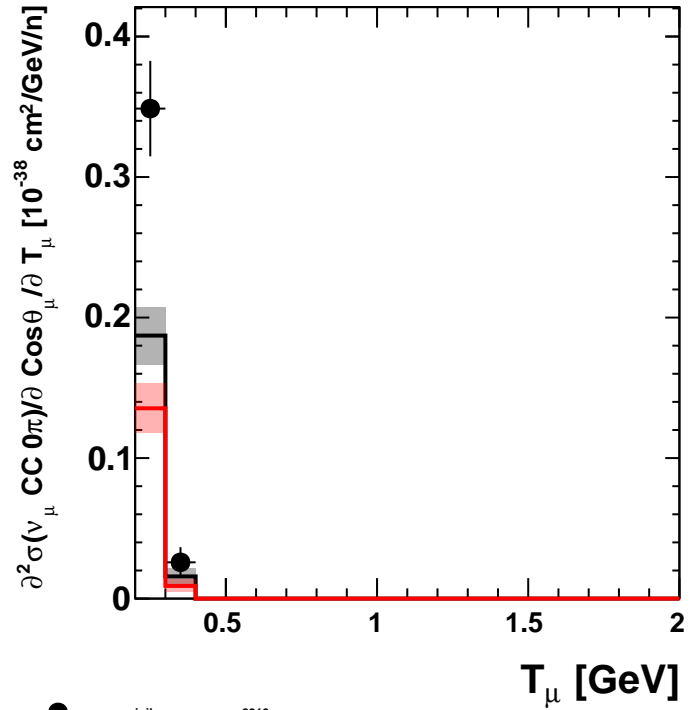
$T_\mu \in [1.9; 2] \text{ GeV}$



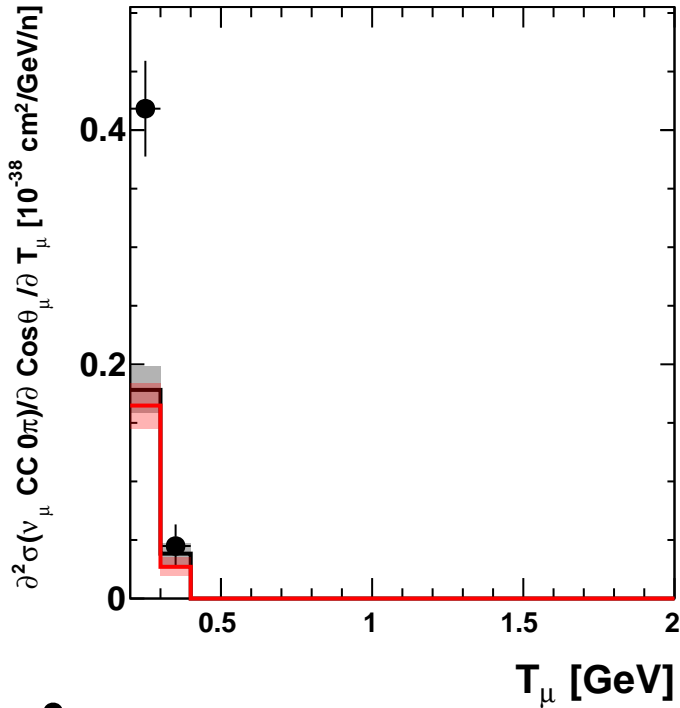
$\text{Cos}\theta_\mu$

$\text{Cos}\theta_\mu \in [-1; -0.9]$ 

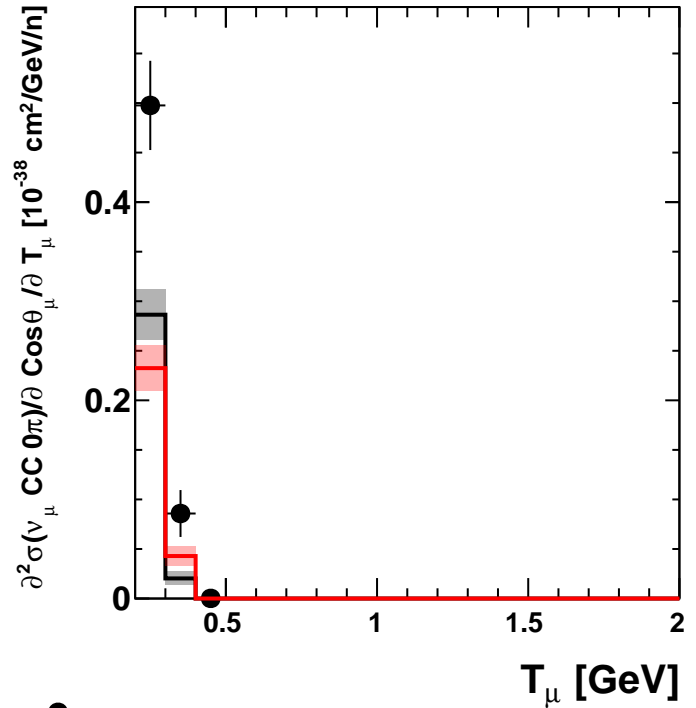
● miniboone_nuccqe_2010
 ■ master:G18_02a_00_000:miniboone_fhc $\chi^2 = 21/2$ DoF
 ■ RESFix:G18_02a_00_000:miniboone_fhc $\chi^2 = 7.54/2$ DoF

 $\text{Cos}\theta_\mu \in [-0.9; -0.8]$ 

● miniboone_nuccqe_2010
 ■ master:G18_02a_00_000:miniboone_fhc $\chi^2 = 17.2/2$ DoF
 ■ RESFix:G18_02a_00_000:miniboone_fhc $\chi^2 = 33.2/2$ DoF

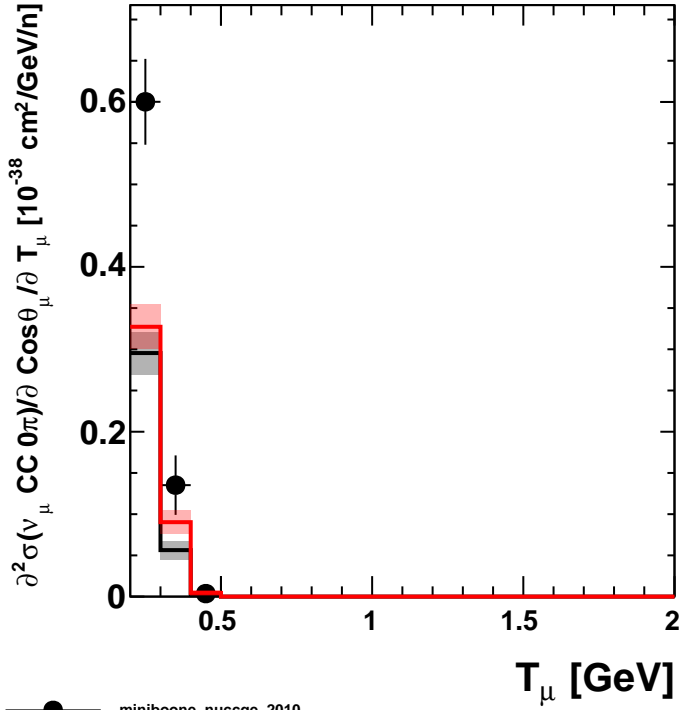
 $\text{Cos}\theta_\mu \in [-0.8; -0.7]$ 

● miniboone_nuccqe_2010
 ■ master:G18_02a_00_000:miniboone_fhc $\chi^2 = 27.9/2$ DoF
 ■ RESFix:G18_02a_00_000:miniboone_fhc $\chi^2 = 32.2/2$ DoF

 $\text{Cos}\theta_\mu \in [-0.7; -0.6]$ 

● miniboone_nuccqe_2010
 ■ master:G18_02a_00_000:miniboone_fhc $\chi^2 = 23.8/3$ DoF
 ■ RESFix:G18_02a_00_000:miniboone_fhc $\chi^2 = 30.4/3$ DoF

$\text{Cos}\theta_\mu \in [-0.6; -0.5]$

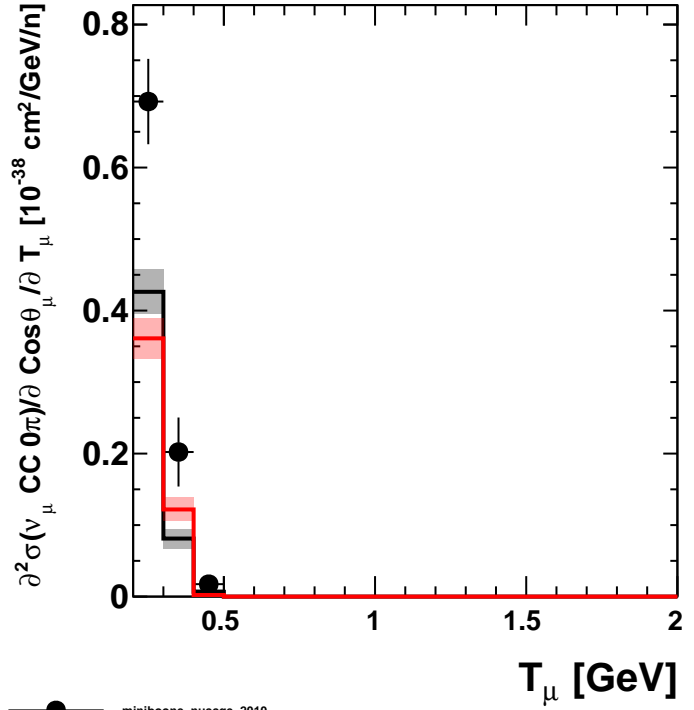


● miniboone_nuccqe_2010

■ master:G18_02a_00_000:miniboone_fhc $\chi^2 = 32/3$ DoF

■ RESFix:G18_02a_00_000:miniboone_fhc $\chi^2 = 23/3$ DoF

$\text{Cos}\theta_\mu \in [-0.5; -0.4]$

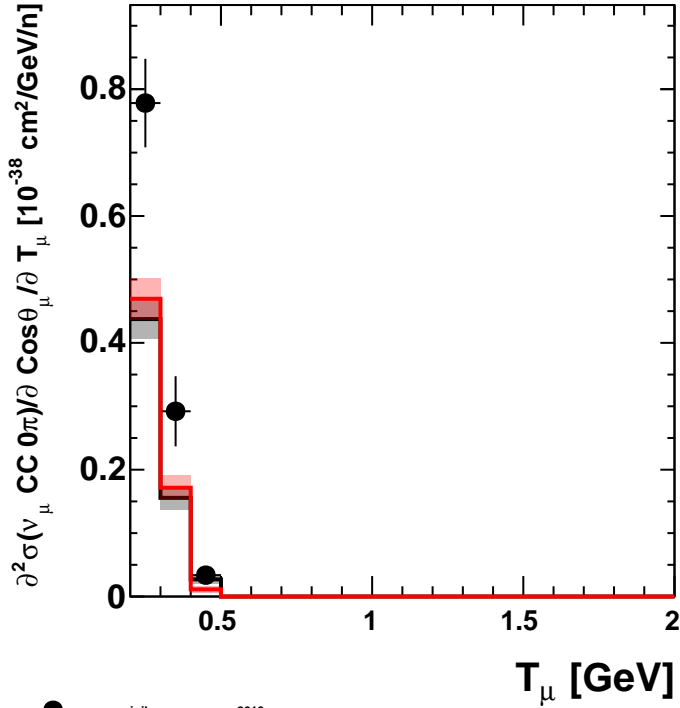


● miniboone_nuccqe_2010

■ master:G18_02a_00_000:miniboone_fhc $\chi^2 = 23.8/3$ DoF

■ RESFix:G18_02a_00_000:miniboone_fhc $\chi^2 = 33.5/3$ DoF

$\text{Cos}\theta_\mu \in [-0.4; -0.3]$

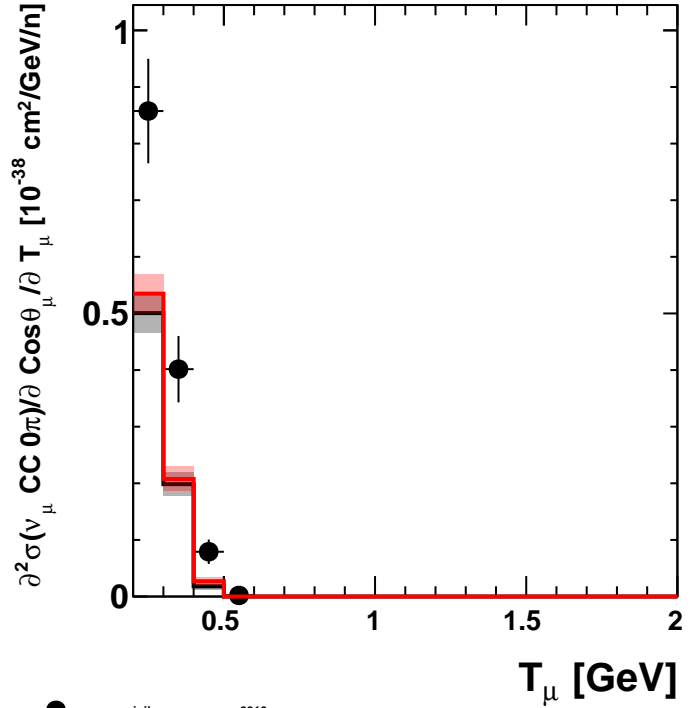


● miniboone_nuccqe_2010

■ master:G18_02a_00_000:miniboone_fhc $\chi^2 = 25.4/3$ DoF

■ RESFix:G18_02a_00_000:miniboone_fhc $\chi^2 = 22.7/3$ DoF

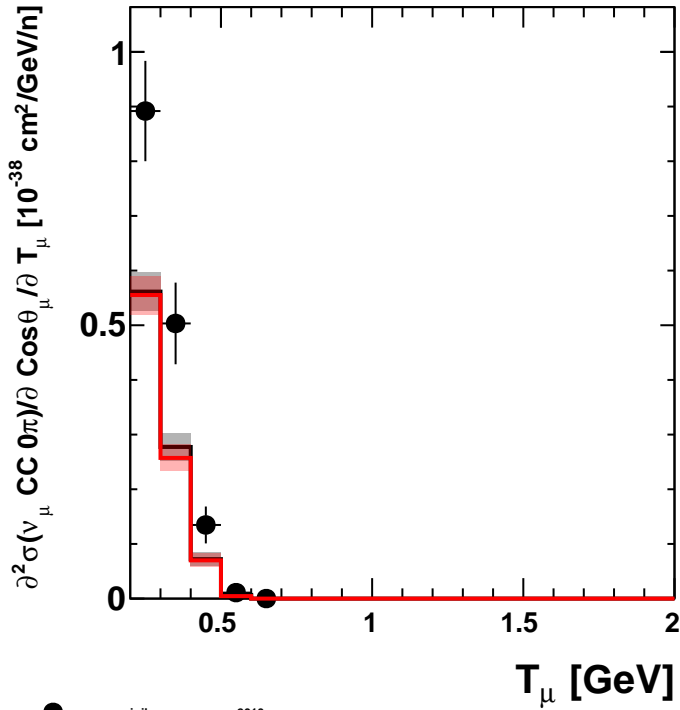
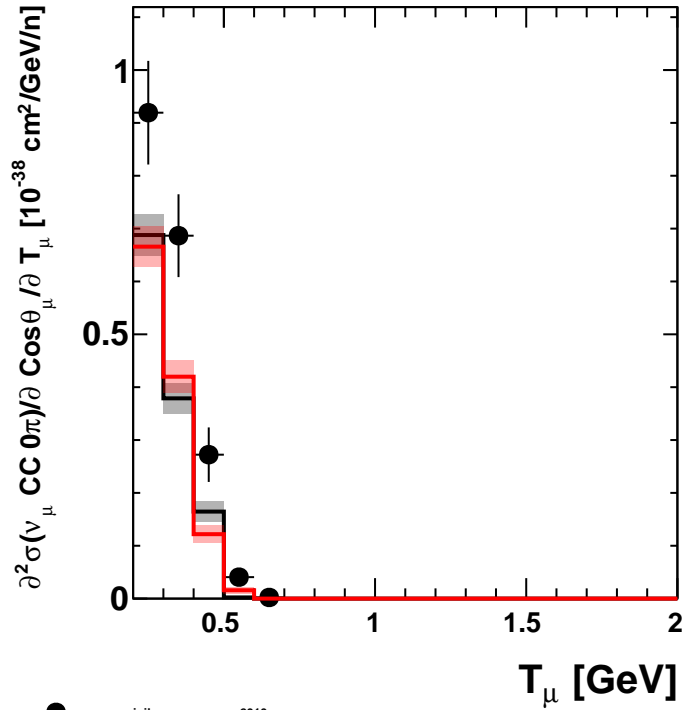
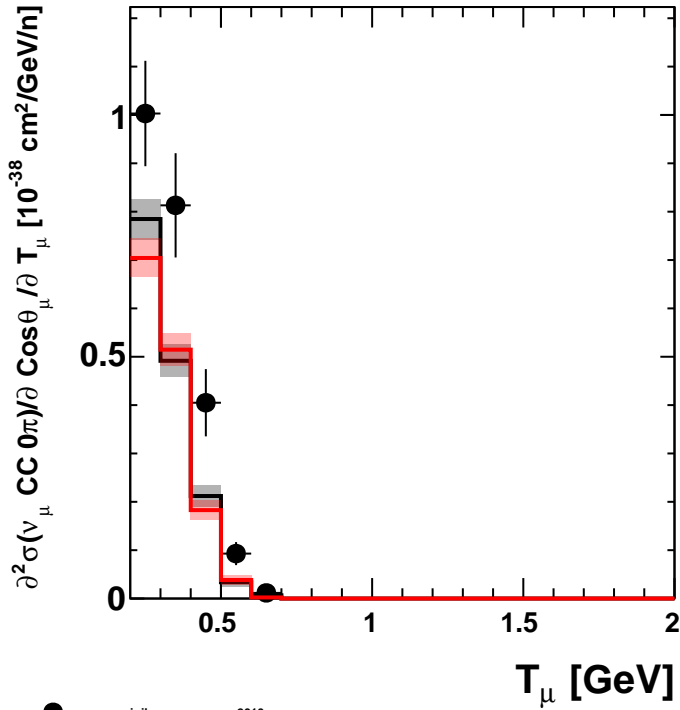
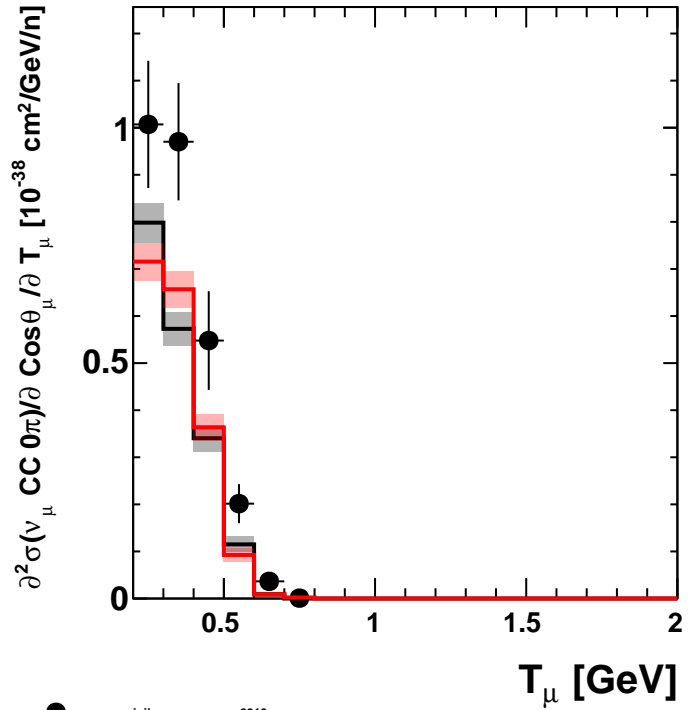
$\text{Cos}\theta_\mu \in [-0.3; -0.2]$



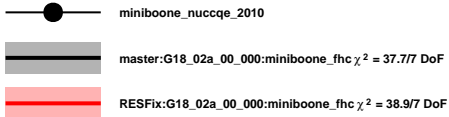
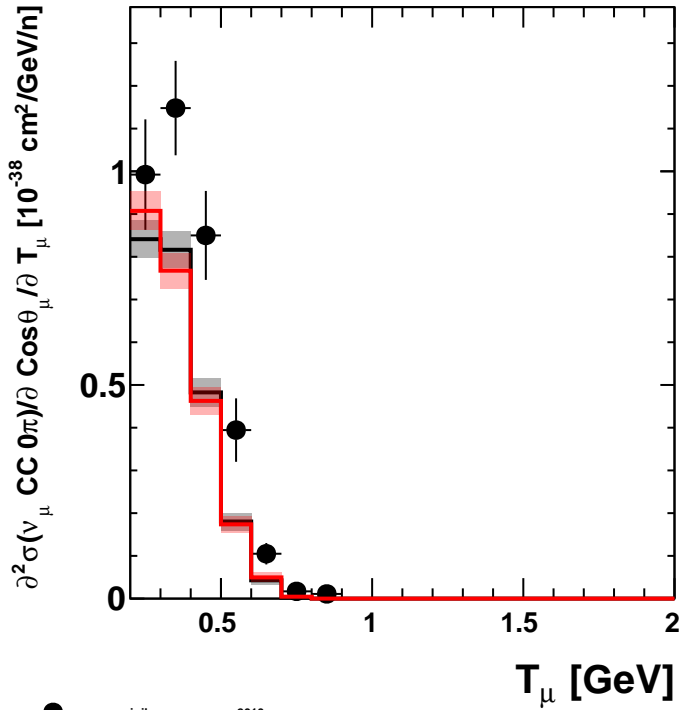
● miniboone_nuccqe_2010

■ master:G18_02a_00_000:miniboone_fhc $\chi^2 = 31.3/4$ DoF

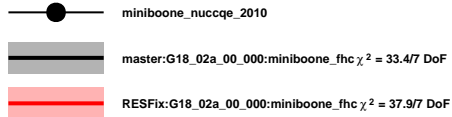
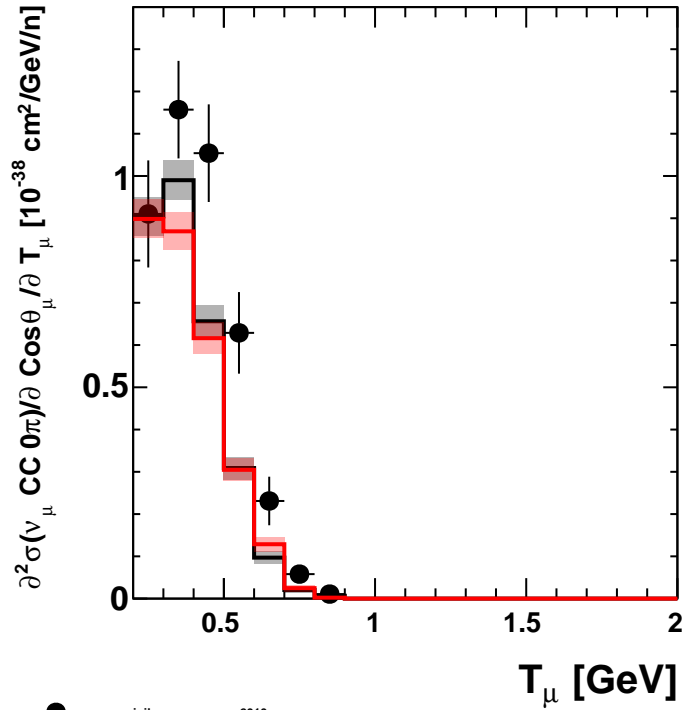
■ RESFix:G18_02a_00_000:miniboone_fhc $\chi^2 = 25.6/4$ DoF

$\text{Cos}\theta_\mu \in [-0.2; -0.1]$  $\text{Cos}\theta_\mu \in [-0.1; 0]$  $\text{Cos}\theta_\mu \in [0; 0.1]$  $\text{Cos}\theta_\mu \in [0.1; 0.2]$ 

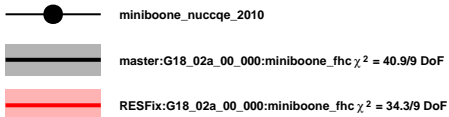
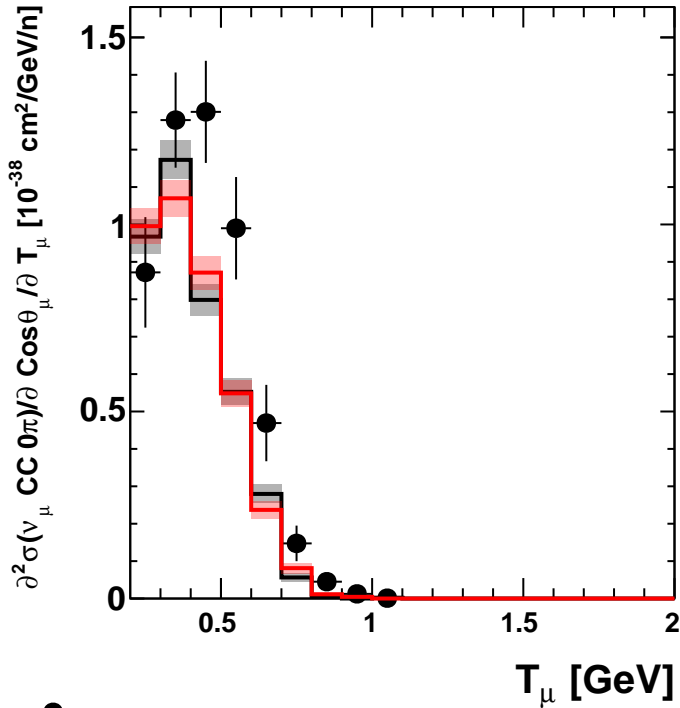
$\text{Cos}\theta_\mu \in [0.2; 0.3]$



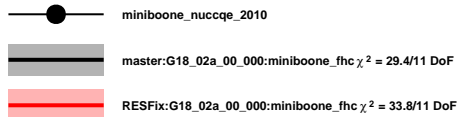
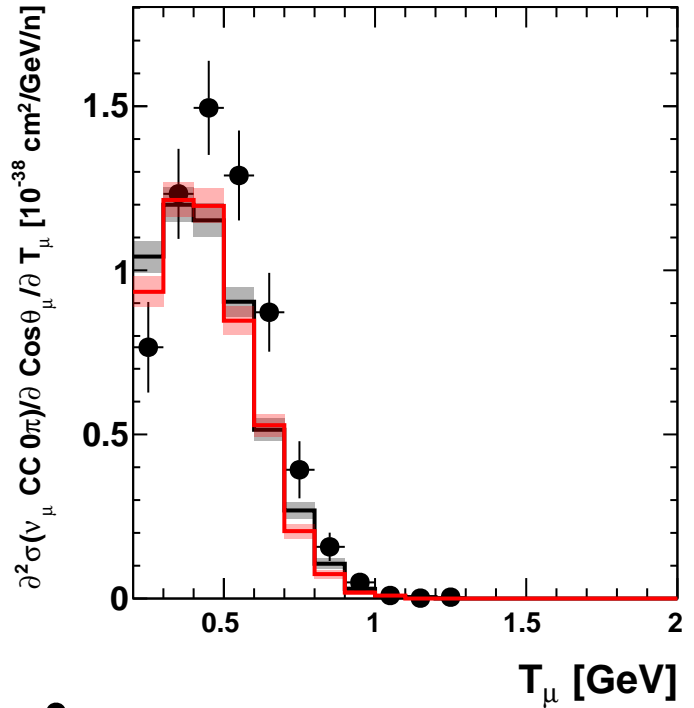
$\text{Cos}\theta_\mu \in [0.3; 0.4]$



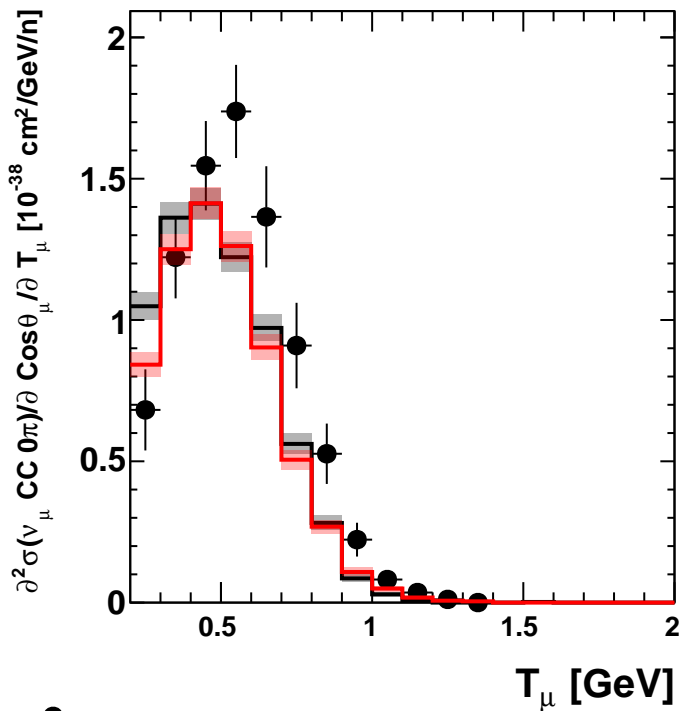
$\text{Cos}\theta_\mu \in [0.4; 0.5]$



$\text{Cos}\theta_\mu \in [0.5; 0.6]$

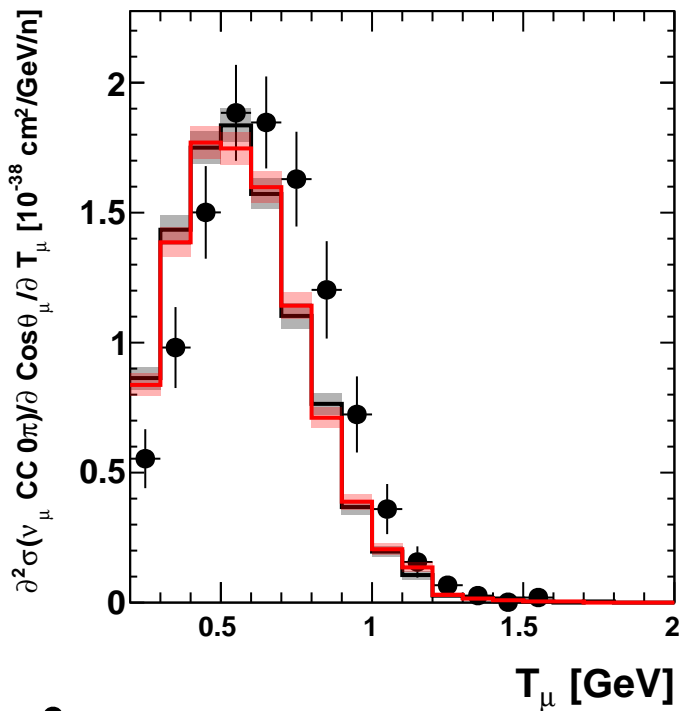


$\text{Cos}\theta_\mu \in [0.6; 0.7]$



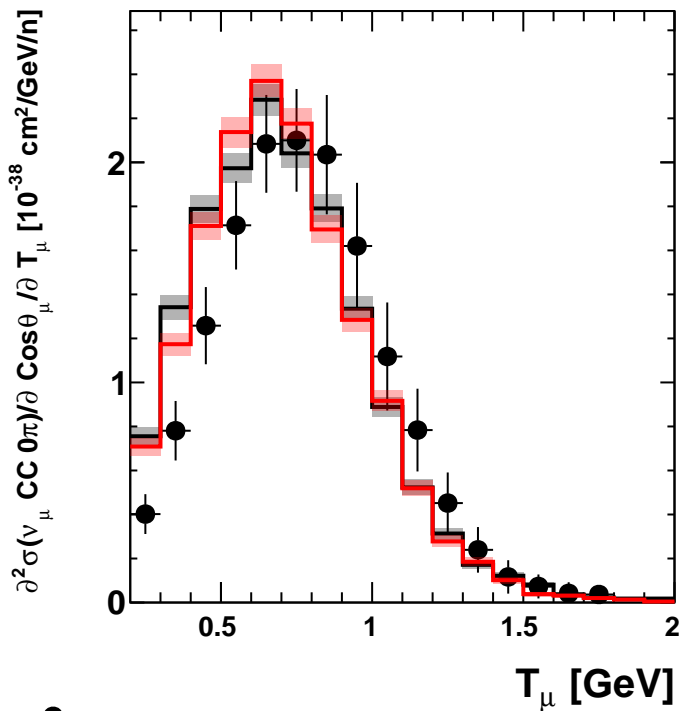
● miniboone_nuccqe_2010
— master:G18_02a_00_000:miniboone_fhc $\chi^2 = 45.1/12$ DoF
— RESFix:G18_02a_00_000:miniboone_fhc $\chi^2 = 34.3/12$ DoF

$\text{Cos}\theta_\mu \in [0.7; 0.8]$



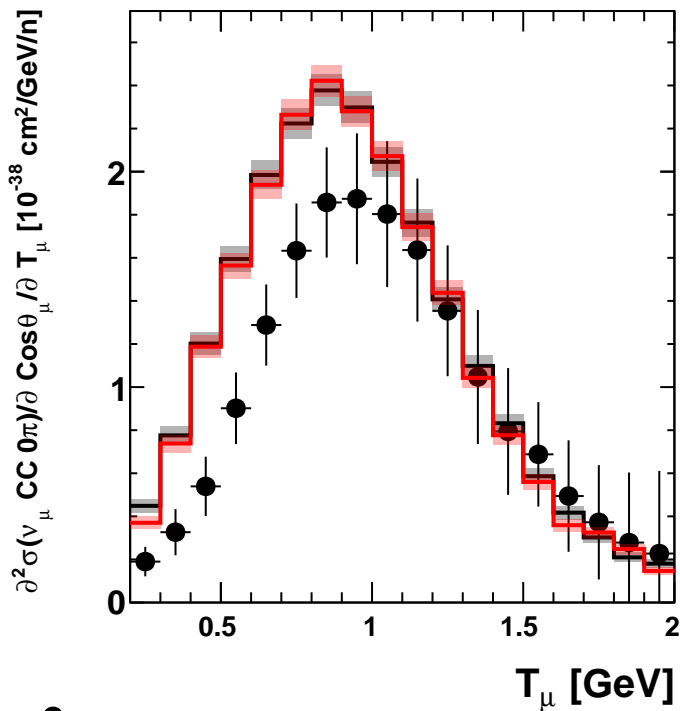
● miniboone_nuccqe_2010
— master:G18_02a_00_000:miniboone_fhc $\chi^2 = 42.6/14$ DoF
— RESFix:G18_02a_00_000:miniboone_fhc $\chi^2 = 38.6/14$ DoF

$\text{Cos}\theta_\mu \in [0.8; 0.9]$



● miniboone_nuccqe_2010
— master:G18_02a_00_000:miniboone_fhc $\chi^2 = 43.8/16$ DoF
— RESFix:G18_02a_00_000:miniboone_fhc $\chi^2 = 36.3/16$ DoF

$\text{Cos}\theta_\mu \in [0.9; 1]$



● miniboone_nuccqe_2010
— master:G18_02a_00_000:miniboone_fhc $\chi^2 = 88.1/18$ DoF
— RESFix:G18_02a_00_000:miniboone_fhc $\chi^2 = 78/18$ DoF

Dataset:

miniboone_nubarccqe_2013

Models:

master/G18_02a_00_000 $\chi^2 = 124 / 78$ DoF

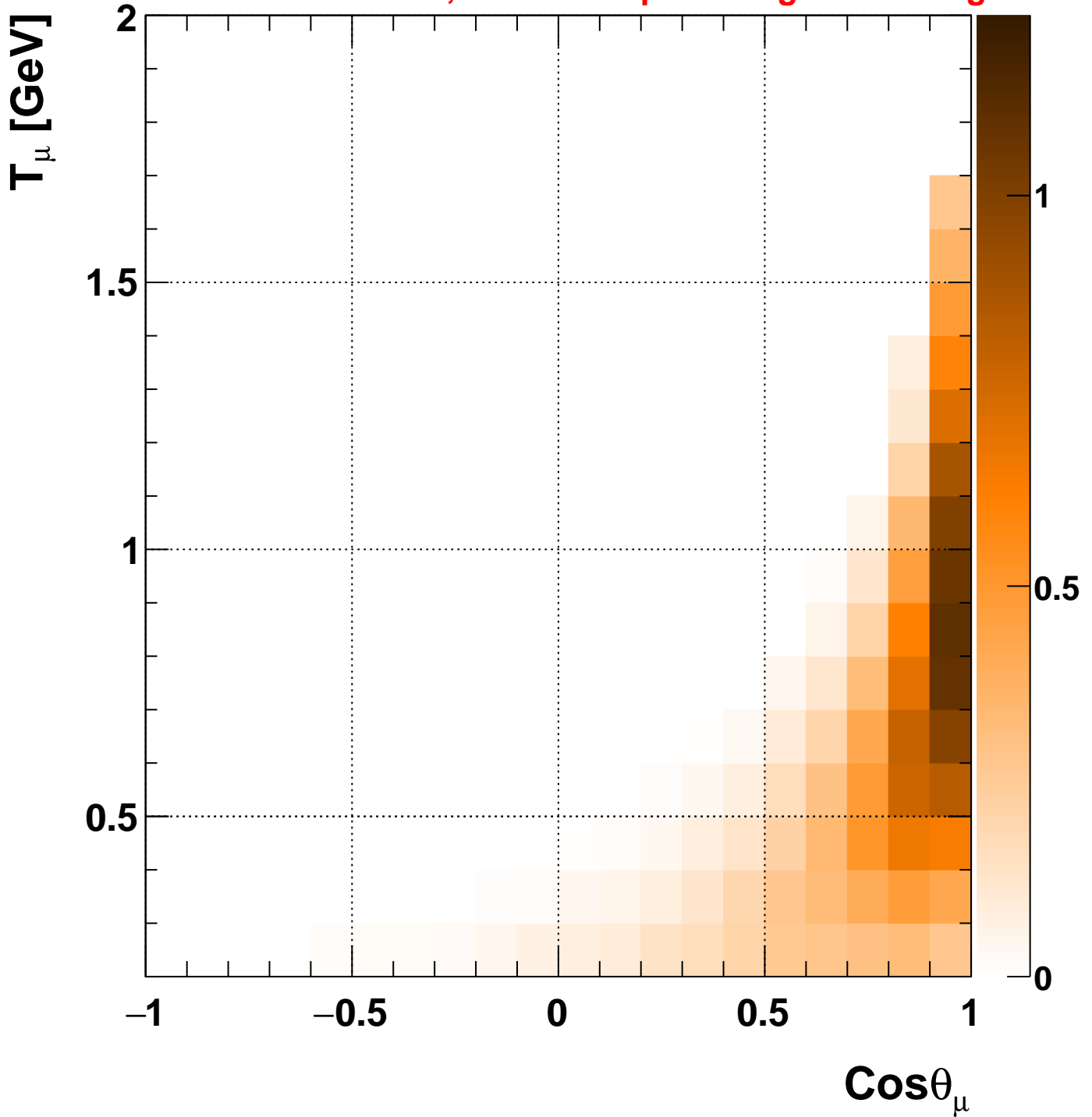
RESFix/G18_02a_00_000 $\chi^2 = 116 / 78$ DoF

Plot:

$\partial^2 \sigma(\bar{\nu}_\mu \text{ CC } 0\pi) / \partial \cos \theta_\mu / \partial T_\mu$

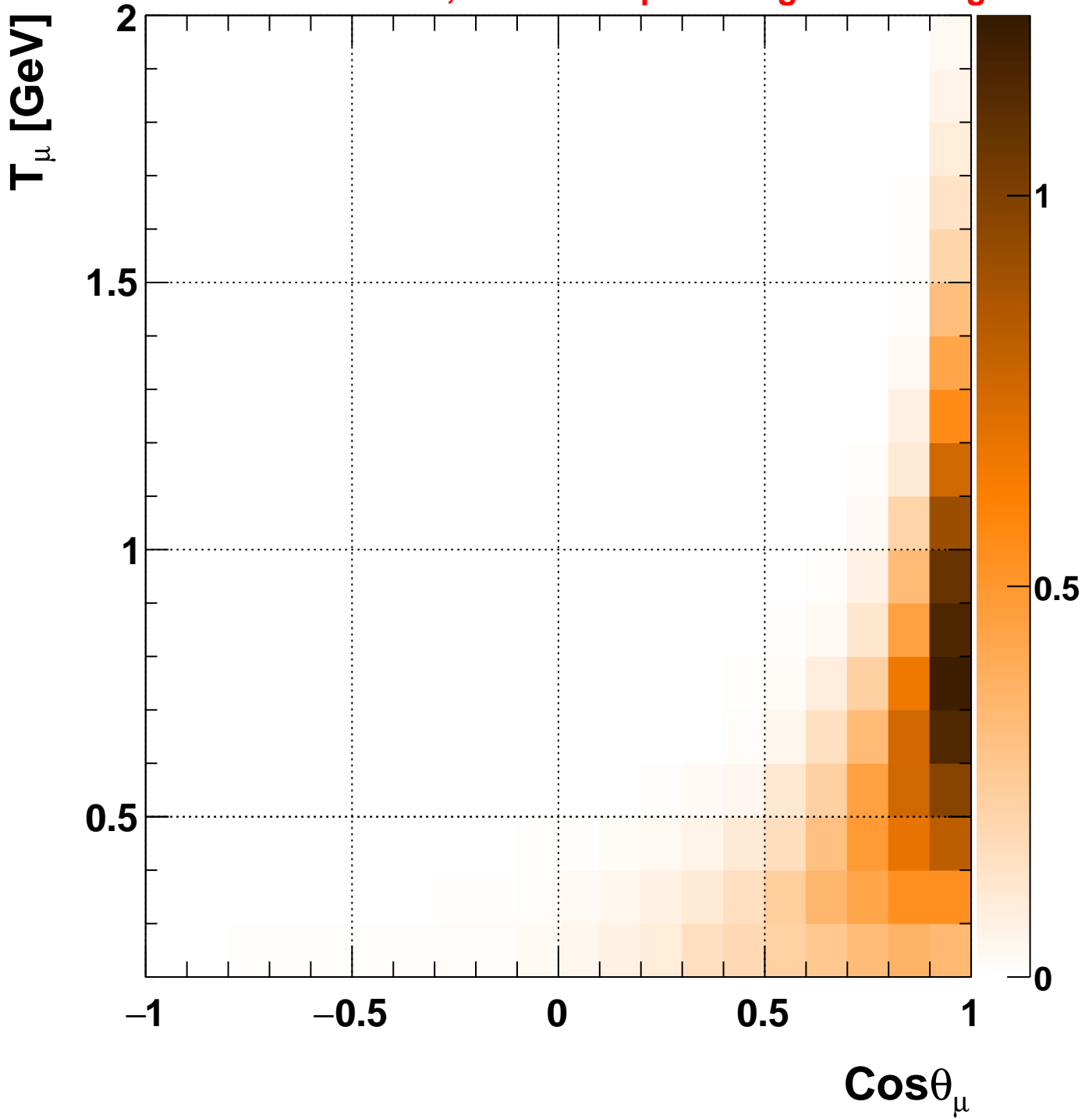
78 DoF, $\chi^2 = 124$ **116**

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$\partial^2 \sigma(\bar{\nu}_\mu \text{ CC } 0\pi) / \partial \text{Cos}\theta_\mu / \partial T_\mu$ [10^{-38} cm²/GeV/n]

Data: miniboone_nubarccqe_2013



$$\partial^2 \sigma(\bar{\nu}_\mu \text{ CC } 0\pi) / \partial \text{Cos}\theta_\mu / \partial T_\mu [10^{-38} \text{ cm}^2/\text{GeV/n}]$$

Pred: master:G18_02a_00_000:miniboone_rhc

miniboone_nubarccqe_2013

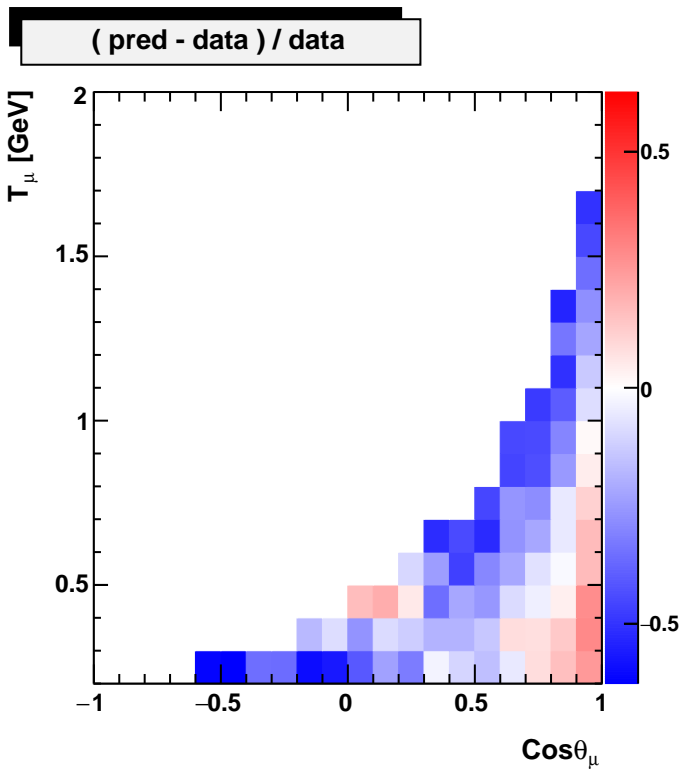
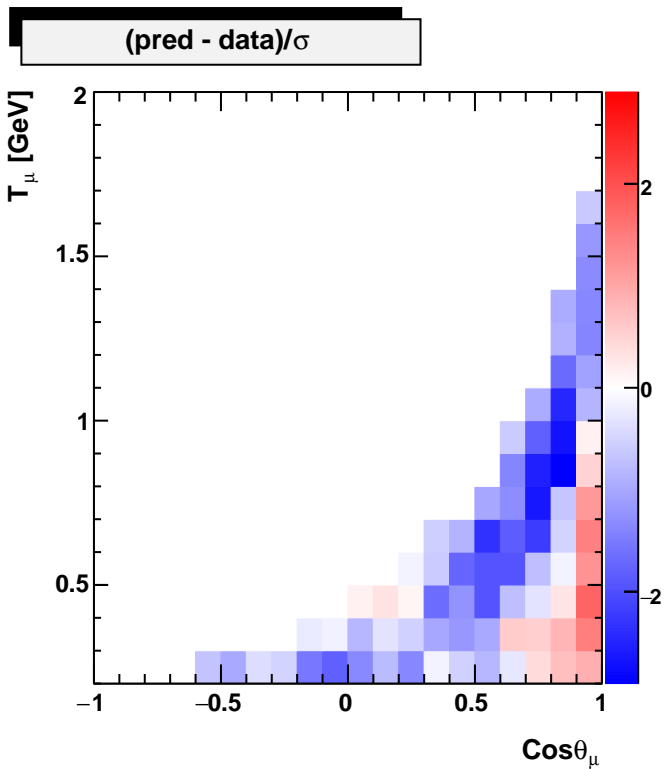
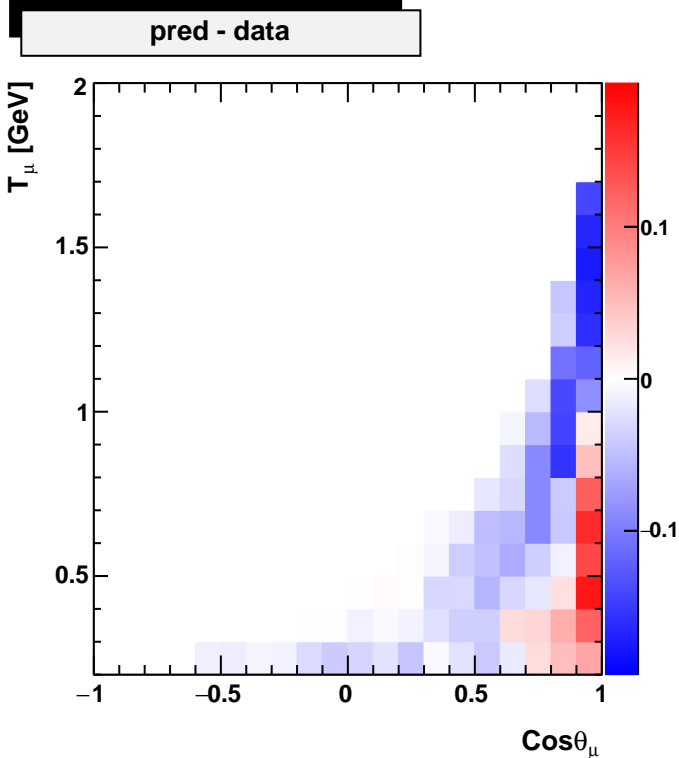
VS

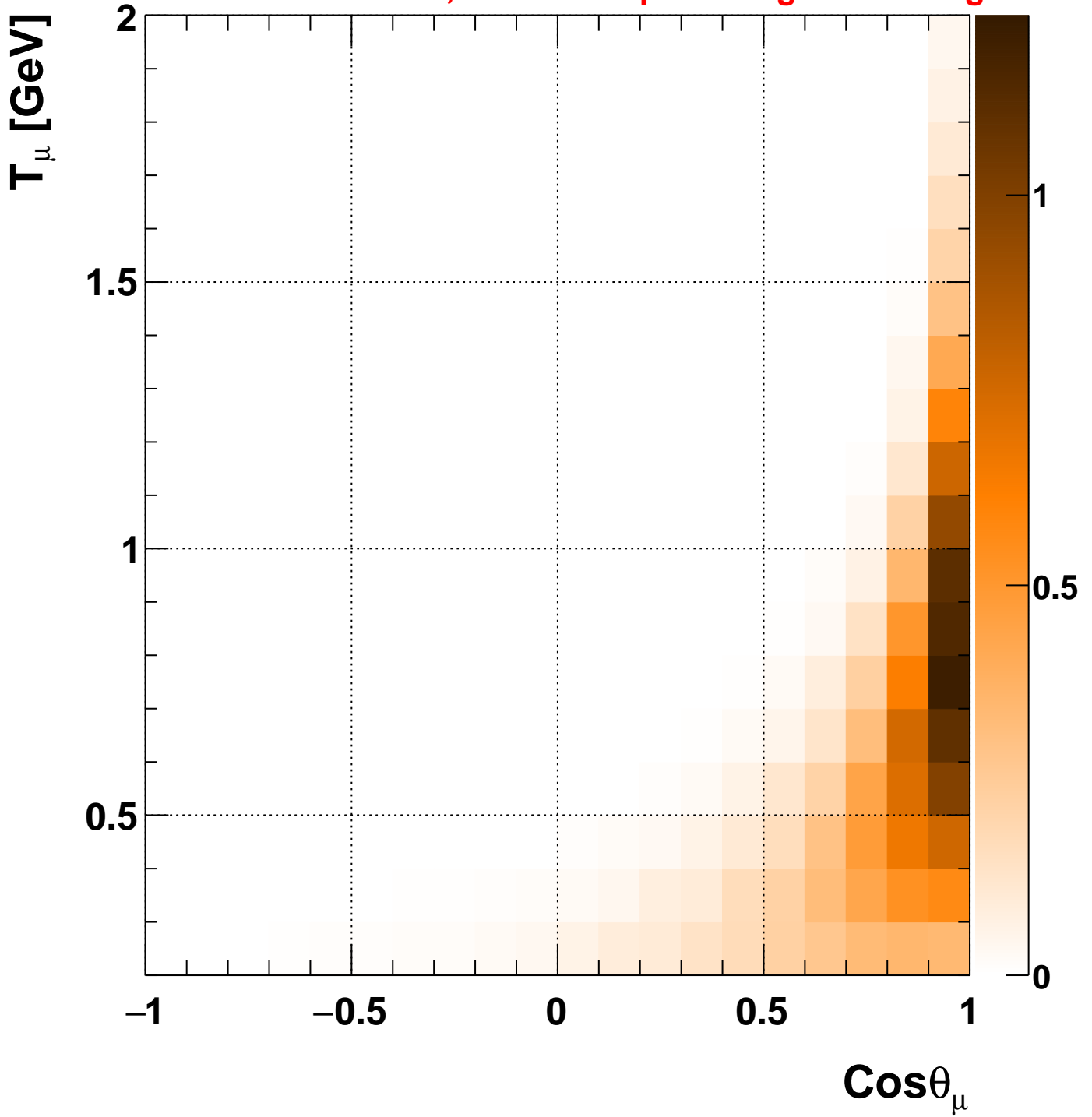
master:G18_02a_00_000:miniboone_rhc

$$\partial^2 \sigma(\bar{\nu}_\mu \text{ CC } 0\pi) / \partial \text{Cos}\theta_\mu \partial T_\mu$$

[$10^{-38} \text{ cm}^2/\text{GeV/n}$]

$\chi^2 = 124.269/78 \text{ DoF}$





$$\frac{\partial^2 \sigma(\bar{\nu}_\mu \text{ CC } 0\pi)}{\partial \text{Cos}\theta_\mu \partial T_\mu} [10^{-38} \text{ cm}^2/\text{GeV/n}]$$

Pred: RESFix:G18_02a_00_000:miniboone_rhc

miniboone_nubarccqe_2013

VS

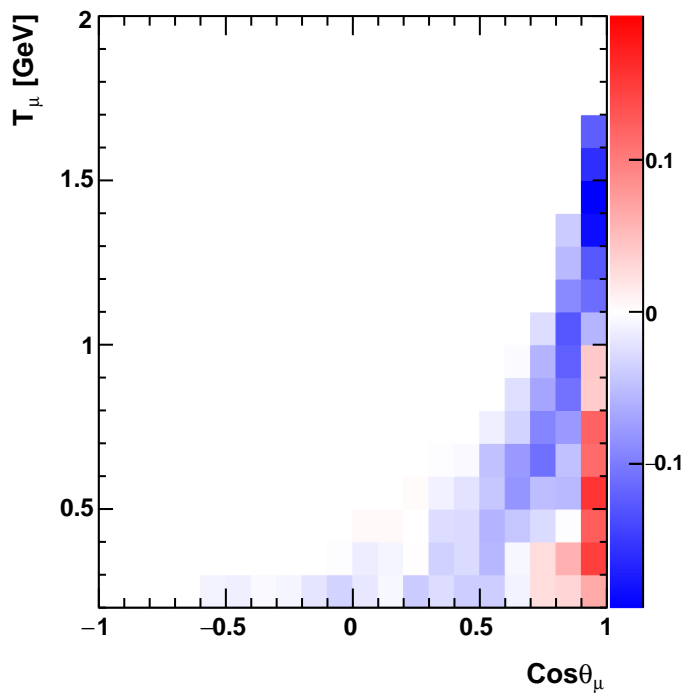
RESFix:G18_02a_00_000:miniboone_rhc

$$\partial^2 \sigma(\bar{\nu}_\mu \text{ CC } 0\pi) / \partial \text{Cos}\theta_\mu / \partial T_\mu$$

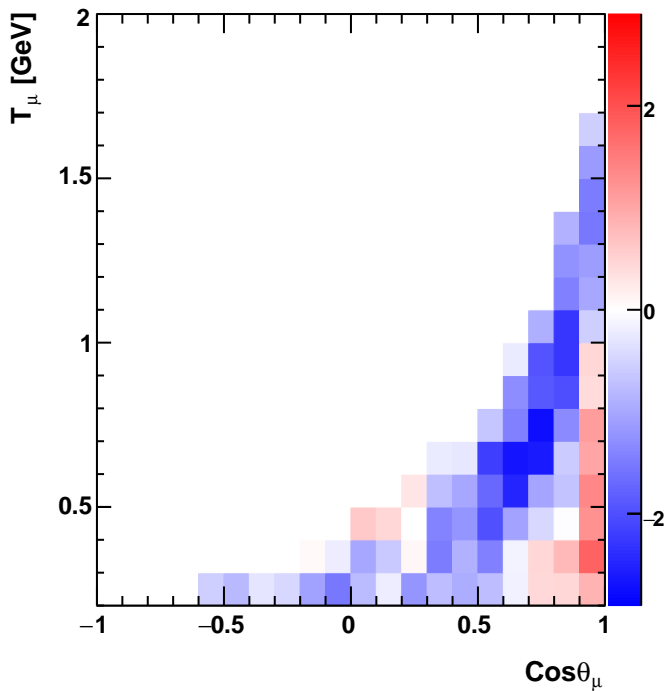
[$10^{-38} \text{ cm}^2/\text{GeV/n}$]

$\chi^2 = 115.934/78 \text{ DoF}$

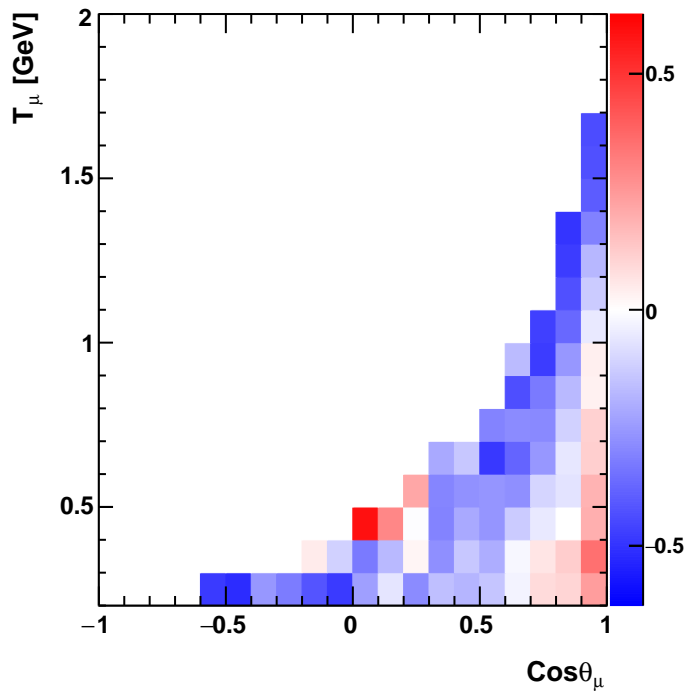
pred - data

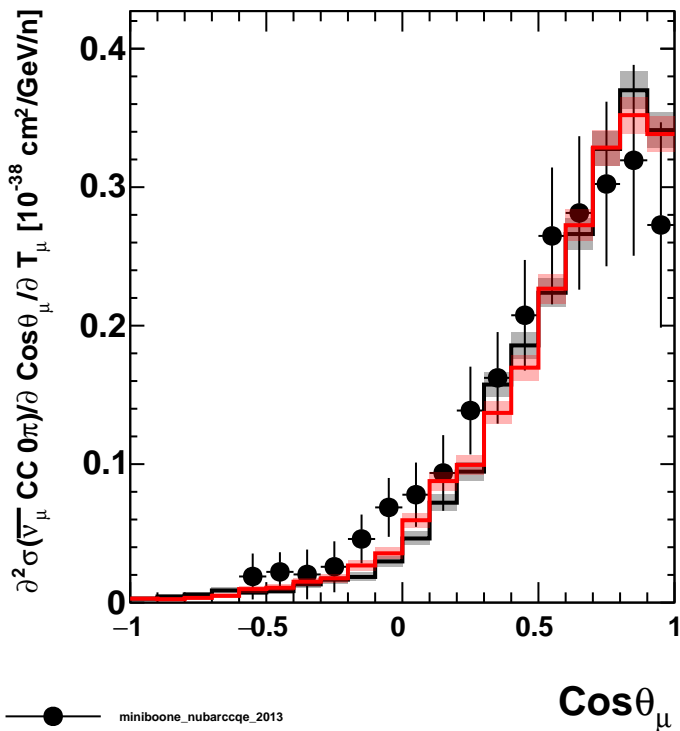


(pred - data)/ σ

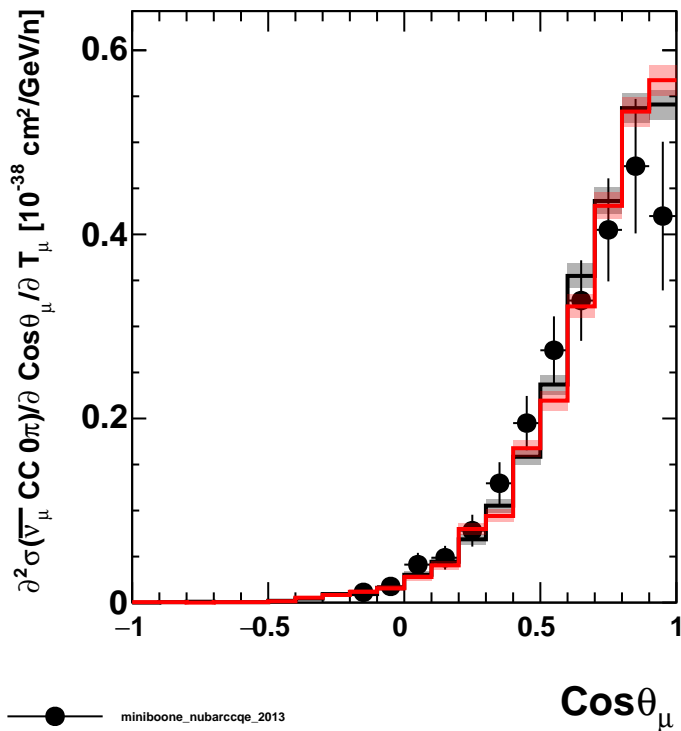


(pred - data) / data

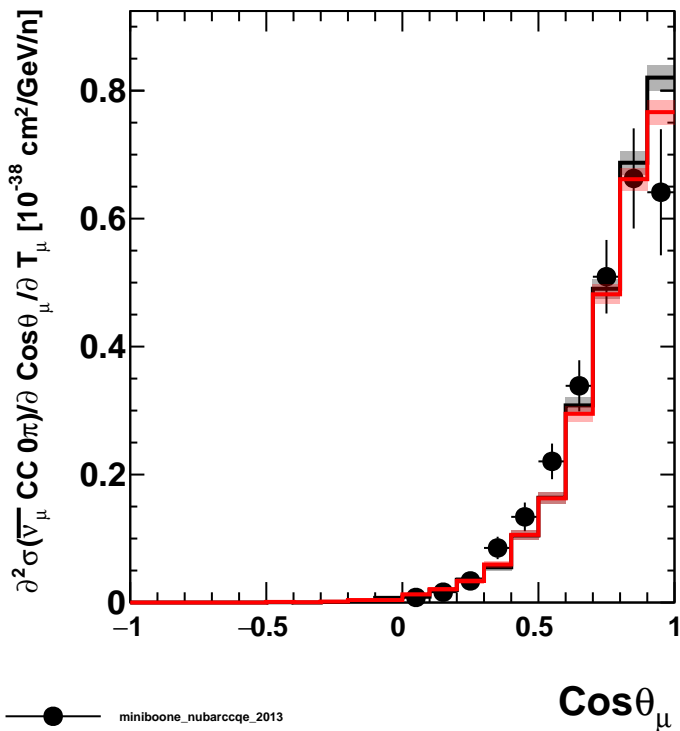


$T_\mu \in [0.2; 0.3] \text{ GeV}$ 

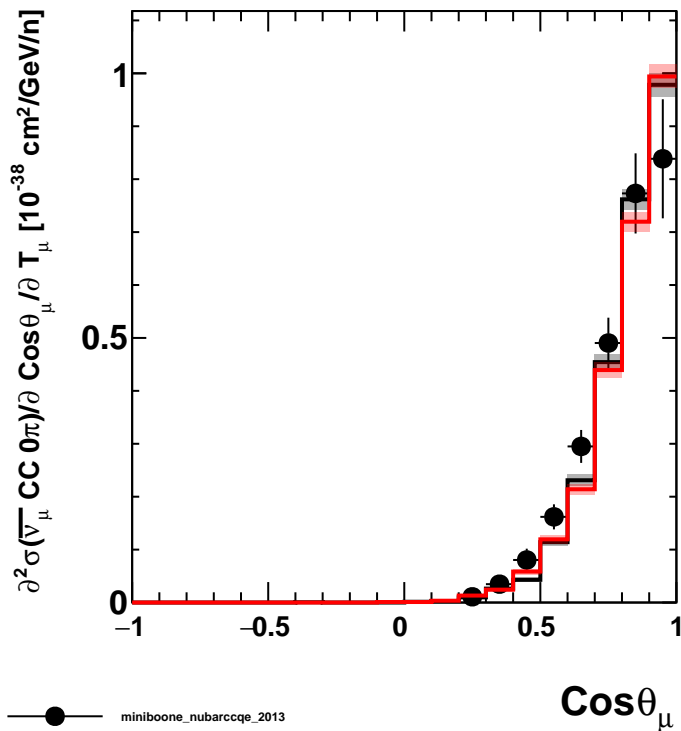
● miniboone_nubarccqe_2013
 ■ master:G18_02a_00_000:miniboone_rhc $\chi^2 = 14.2/16$ DoF
 ■ RESFix:G18_02a_00_000:miniboone_rhc $\chi^2 = 9.95/16$ DoF

 $T_\mu \in [0.3; 0.4] \text{ GeV}$ 

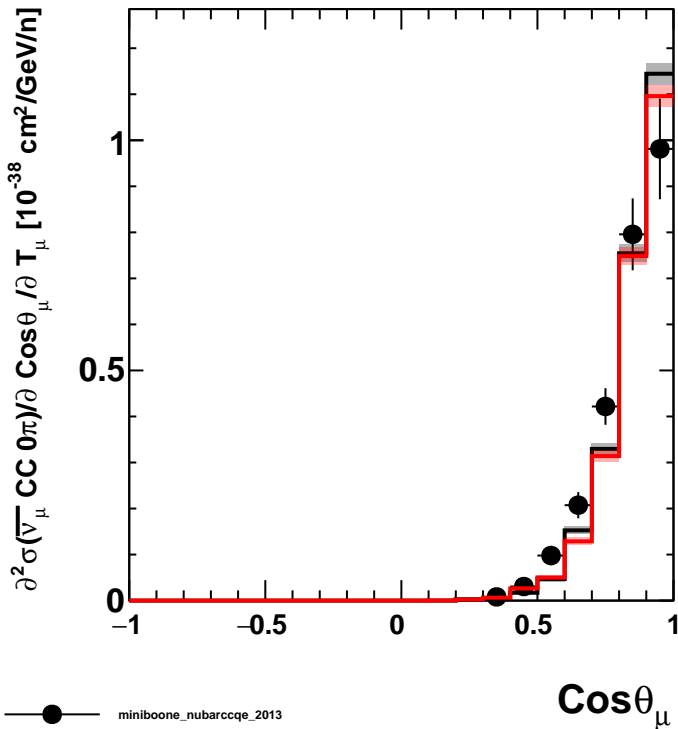
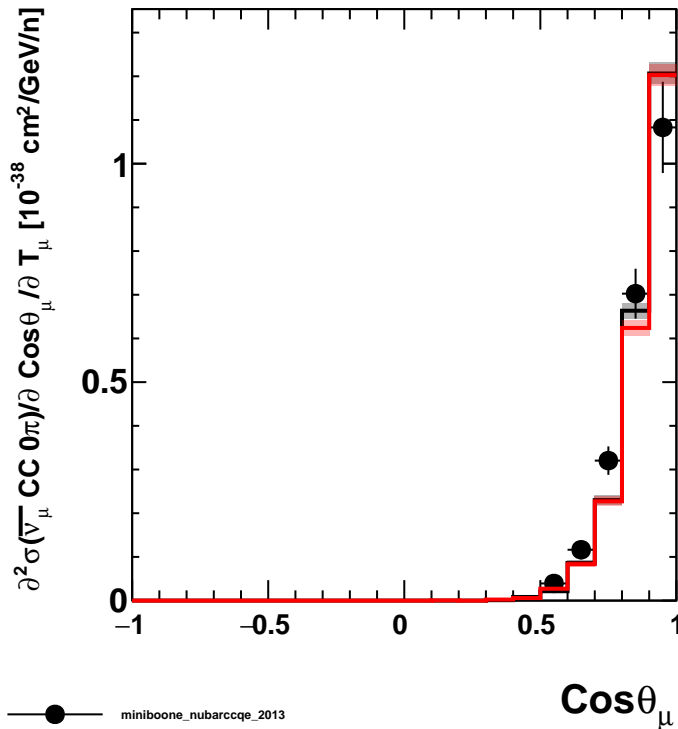
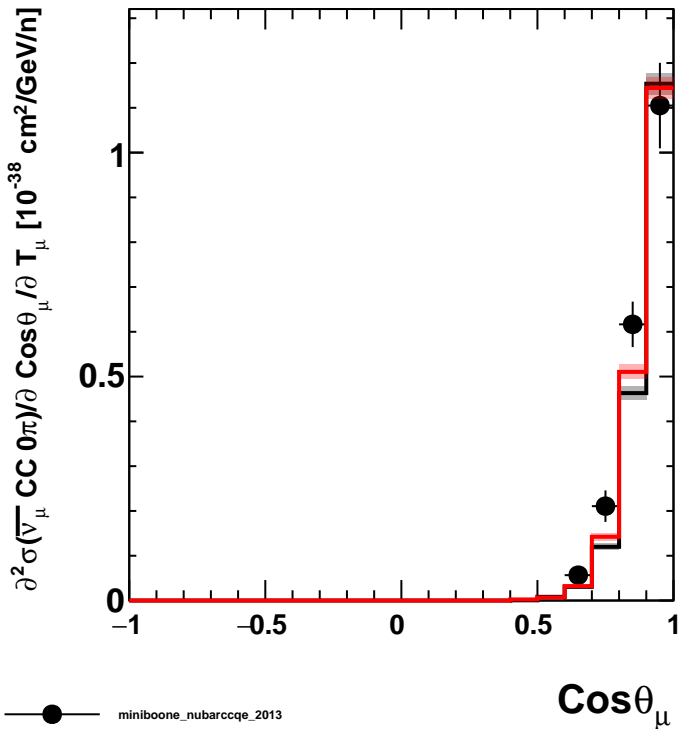
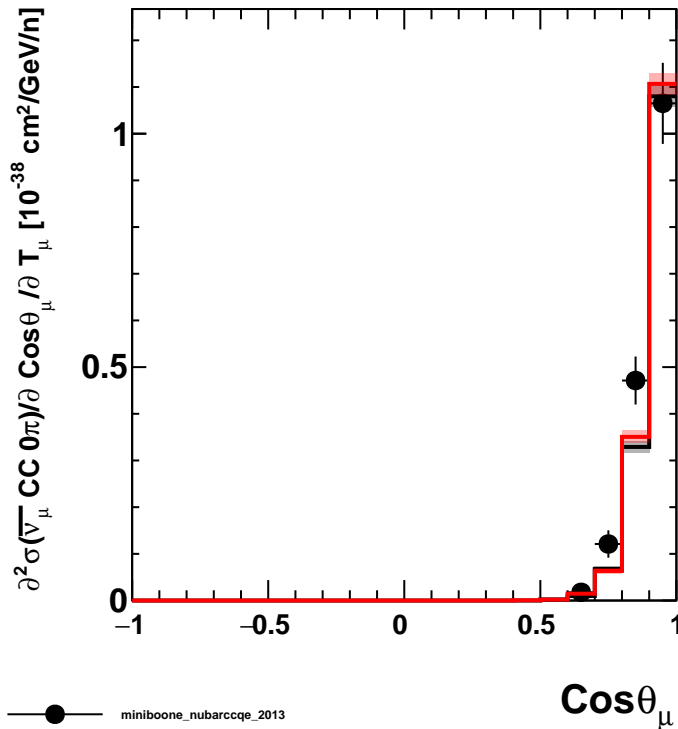
● miniboone_nubarccqe_2013
 ■ master:G18_02a_00_000:miniboone_rhc $\chi^2 = 8.02/12$ DoF
 ■ RESFix:G18_02a_00_000:miniboone_rhc $\chi^2 = 10.5/12$ DoF

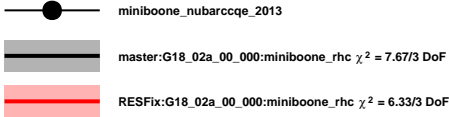
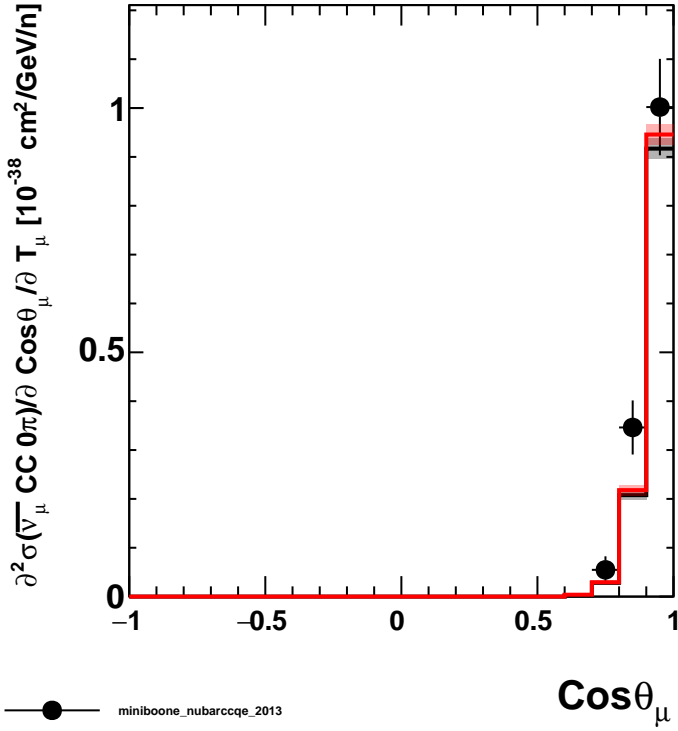
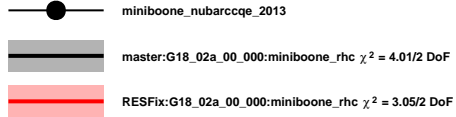
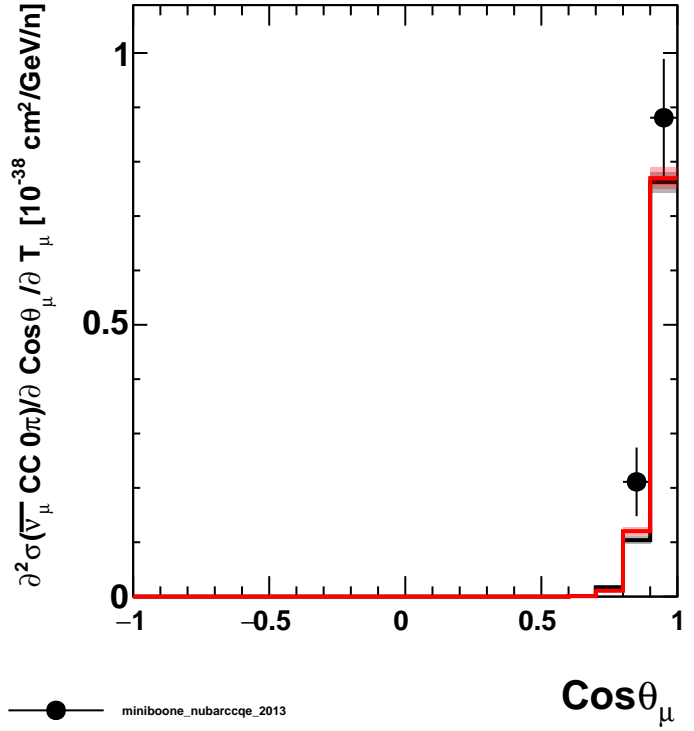
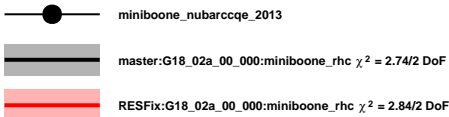
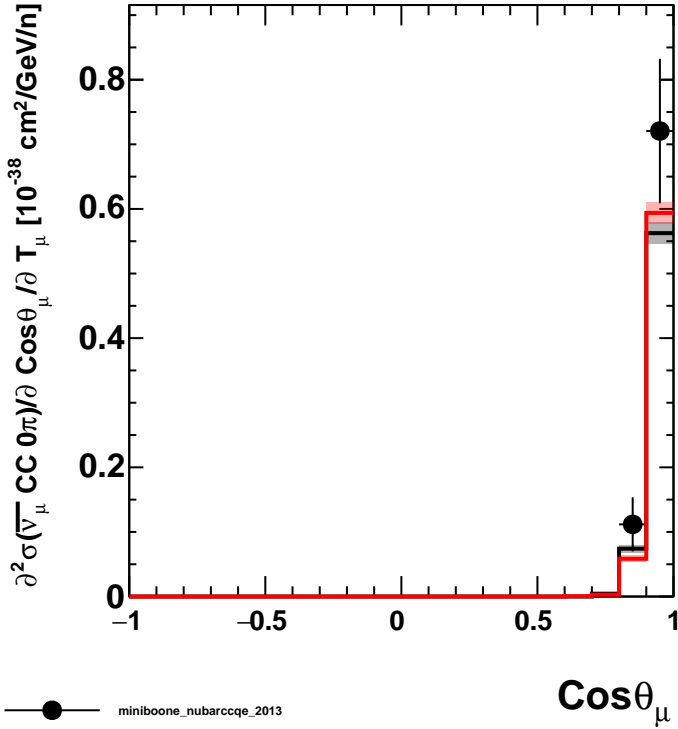
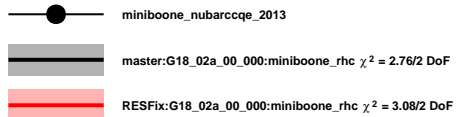
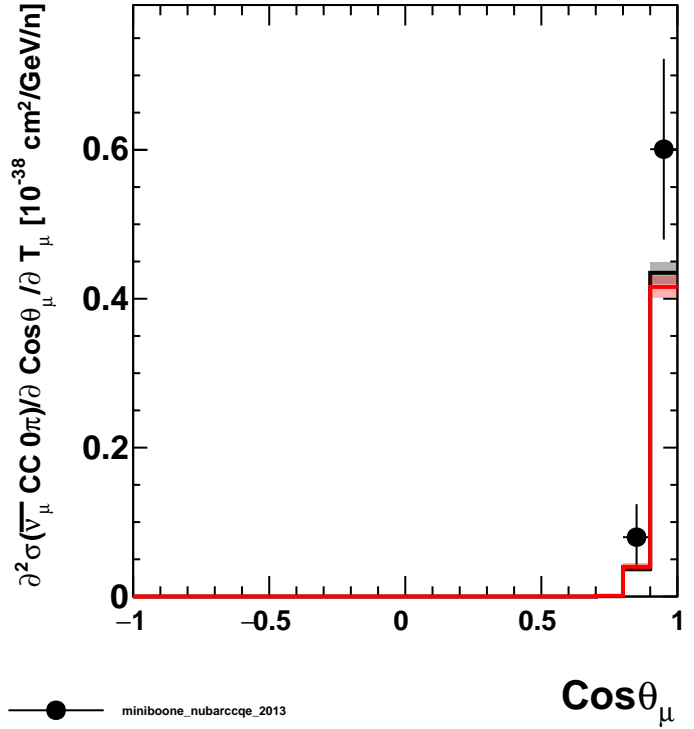
 $T_\mu \in [0.4; 0.5] \text{ GeV}$ 

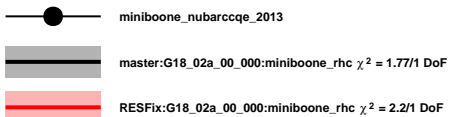
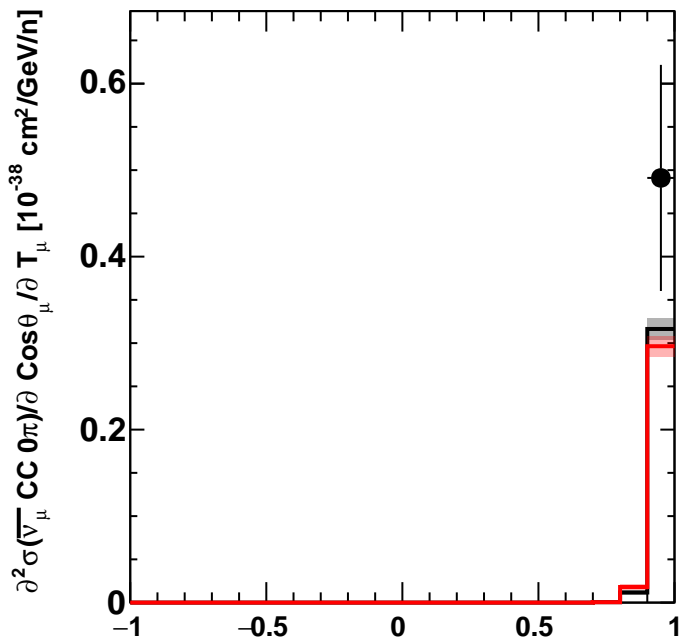
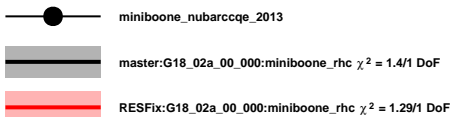
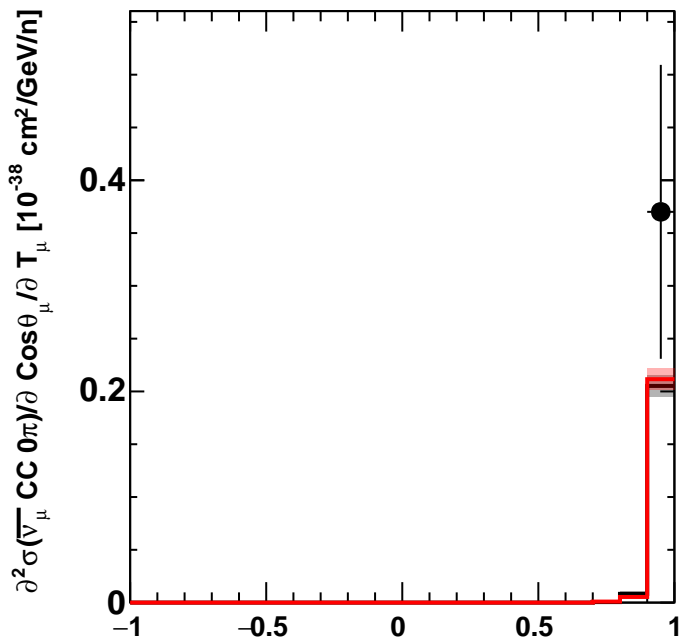
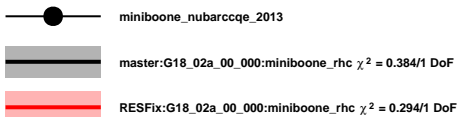
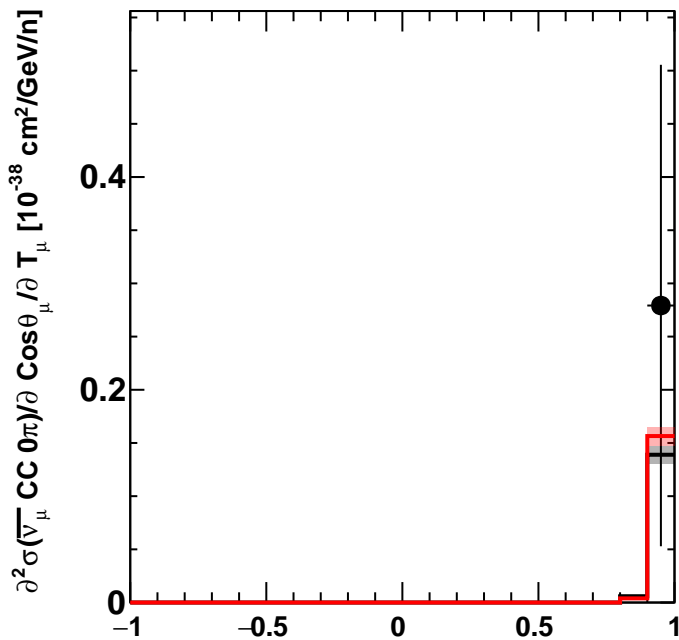
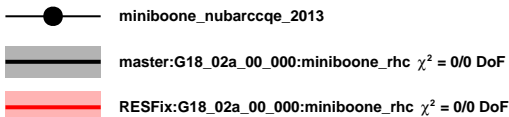
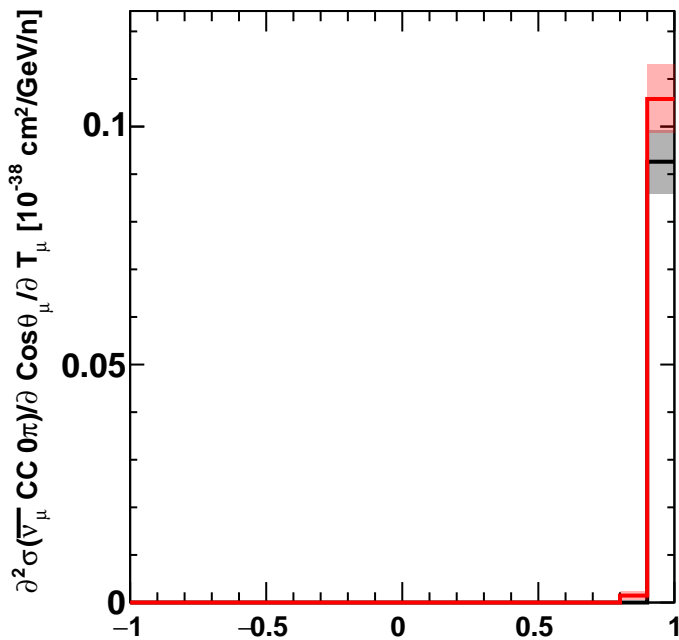
● miniboone_nubarccqe_2013
 ■ master:G18_02a_00_000:miniboone_rhc $\chi^2 = 12.1/10$ DoF
 ■ RESFix:G18_02a_00_000:miniboone_rhc $\chi^2 = 10.8/10$ DoF

 $T_\mu \in [0.5; 0.6] \text{ GeV}$ 

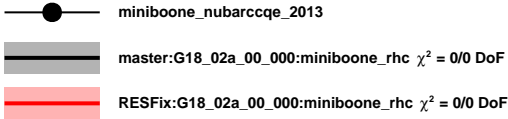
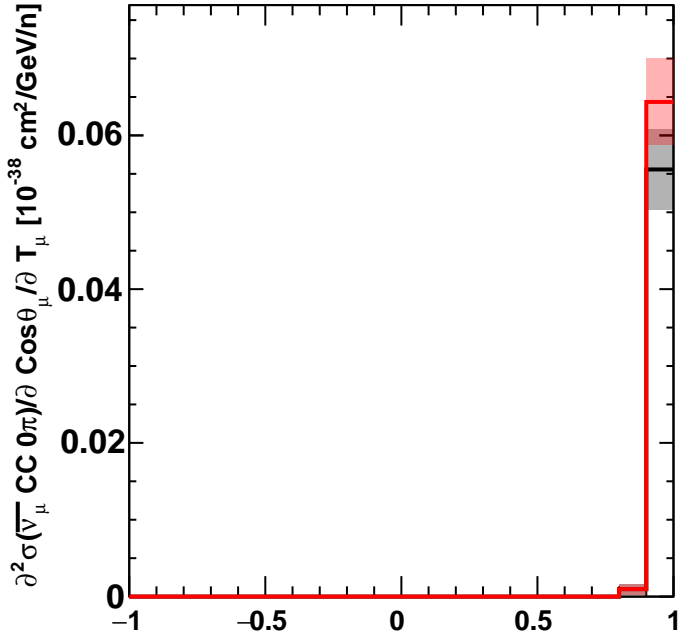
● miniboone_nubarccqe_2013
 ■ master:G18_02a_00_000:miniboone_rhc $\chi^2 = 12.8/8$ DoF
 ■ RESFix:G18_02a_00_000:miniboone_rhc $\chi^2 = 14/8$ DoF

$T_\mu \in [0.6; 0.7] \text{ GeV}$  $T_\mu \in [0.7; 0.8] \text{ GeV}$  $T_\mu \in [0.8; 0.9] \text{ GeV}$  $T_\mu \in [0.9; 1] \text{ GeV}$ 

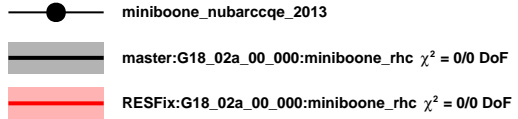
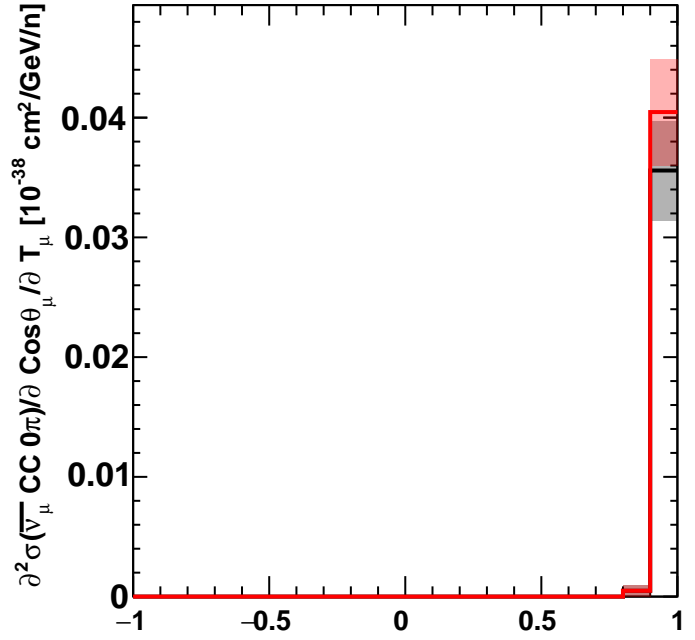
$T_\mu \in [1; 1.1] \text{ GeV}$  $T_\mu \in [1.1; 1.2] \text{ GeV}$  $T_\mu \in [1.2; 1.3] \text{ GeV}$  $T_\mu \in [1.3; 1.4] \text{ GeV}$ 

$T_\mu \in [1.4; 1.5] \text{ GeV}$  $\text{Cos}\theta_\mu$ $T_\mu \in [1.5; 1.6] \text{ GeV}$  $\text{Cos}\theta_\mu$ $T_\mu \in [1.6; 1.7] \text{ GeV}$  $\text{Cos}\theta_\mu$ $T_\mu \in [1.7; 1.8] \text{ GeV}$  $\text{Cos}\theta_\mu$

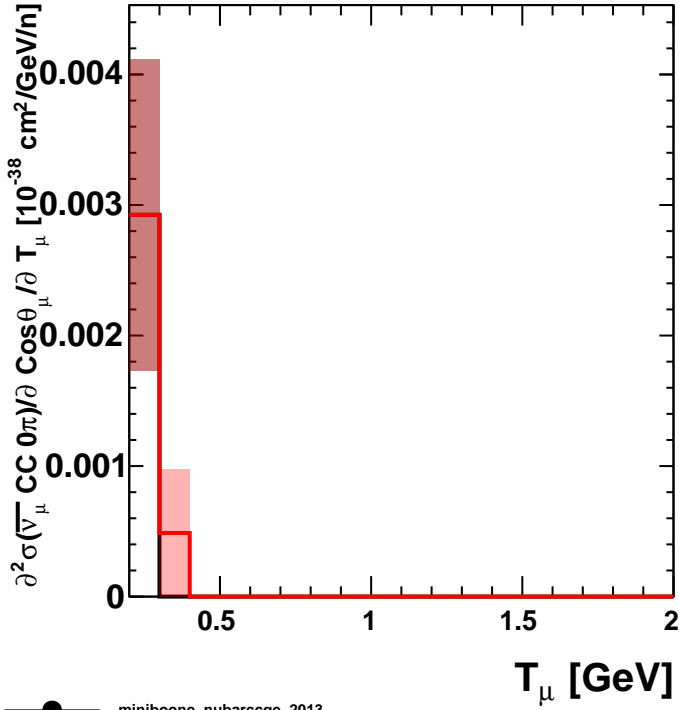
$T_\mu \in [1.8; 1.9] \text{ GeV}$



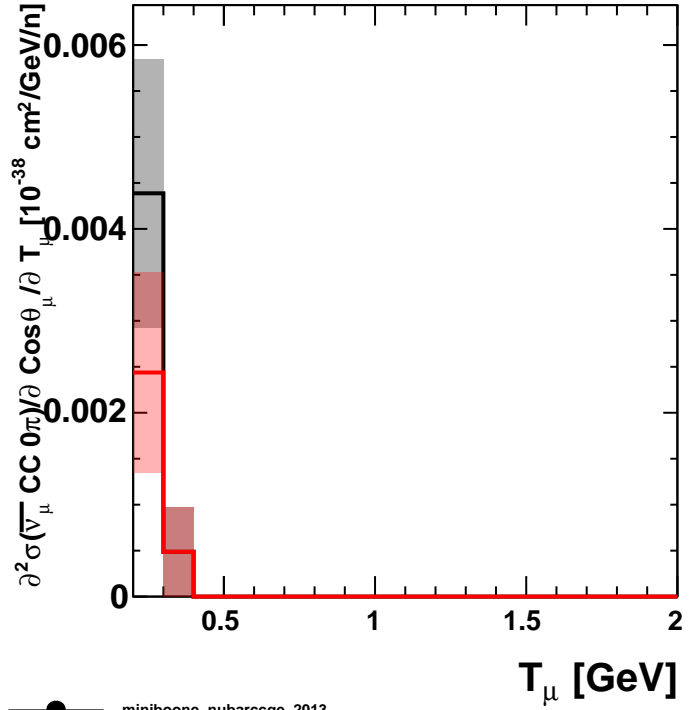
$T_\mu \in [1.9; 2] \text{ GeV}$



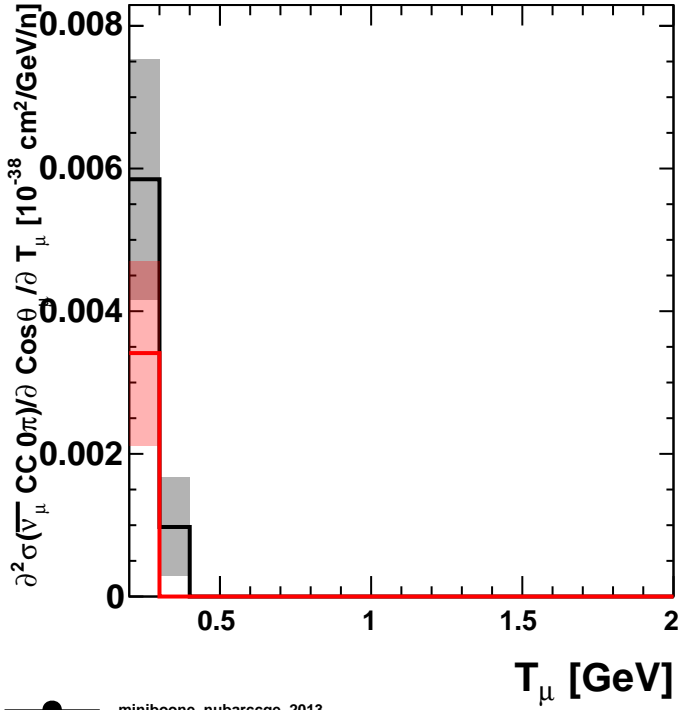
$\text{Cos}\theta_\mu \in [-1; -0.9]$



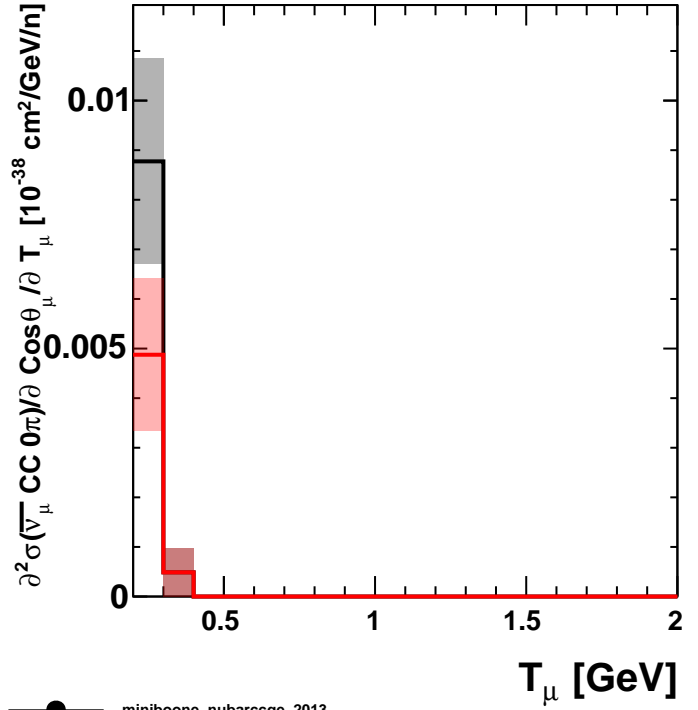
$\text{Cos}\theta_\mu \in [-0.9; -0.8]$



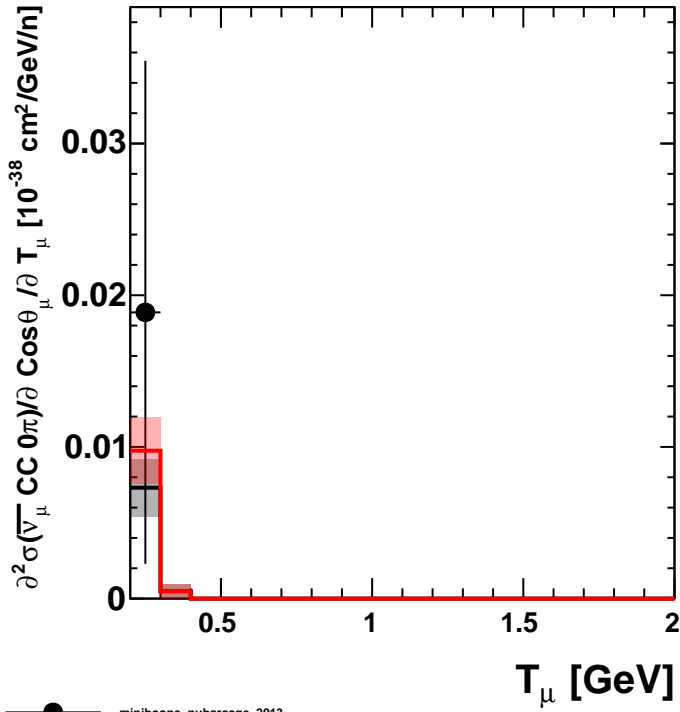
$\text{Cos}\theta_\mu \in [-0.8; -0.7]$



$\text{Cos}\theta_\mu \in [-0.7; -0.6]$

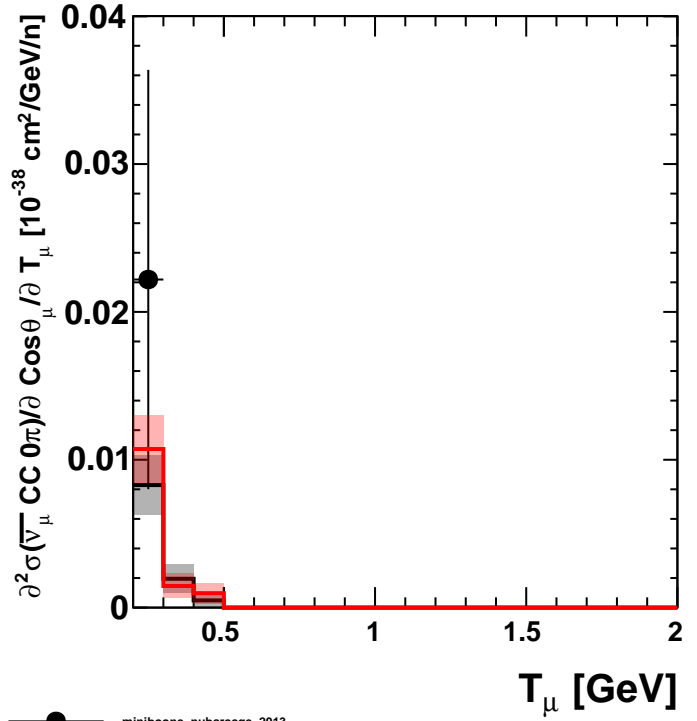


$\text{Cos}\theta_\mu \in [-0.6; -0.5]$



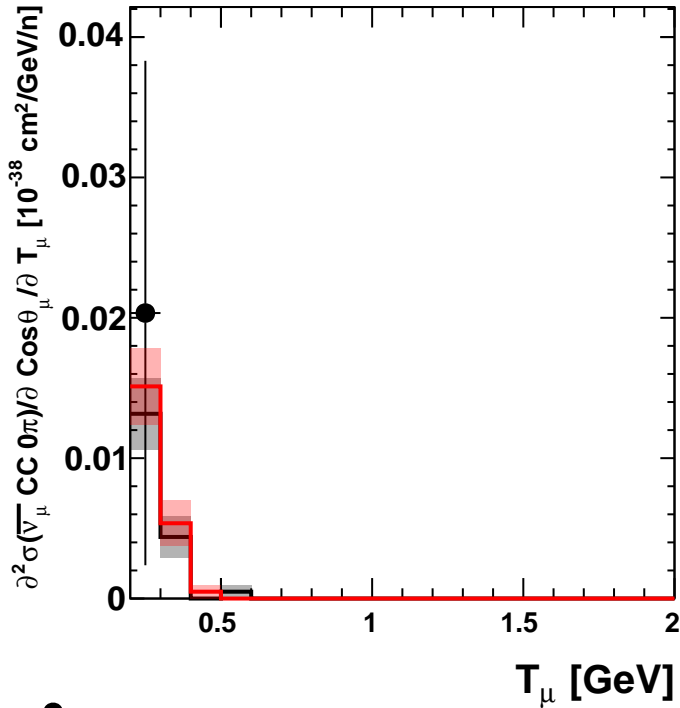
● miniboone_nubarccqe_2013
■ master:G18_02a_00_000:miniboone_rhc $\chi^2 = 0.48/1$ DoF
■ RESFix:G18_02a_00_000:miniboone_rhc $\chi^2 = 0.297/1$ DoF

$\text{Cos}\theta_\mu \in [-0.5; -0.4]$



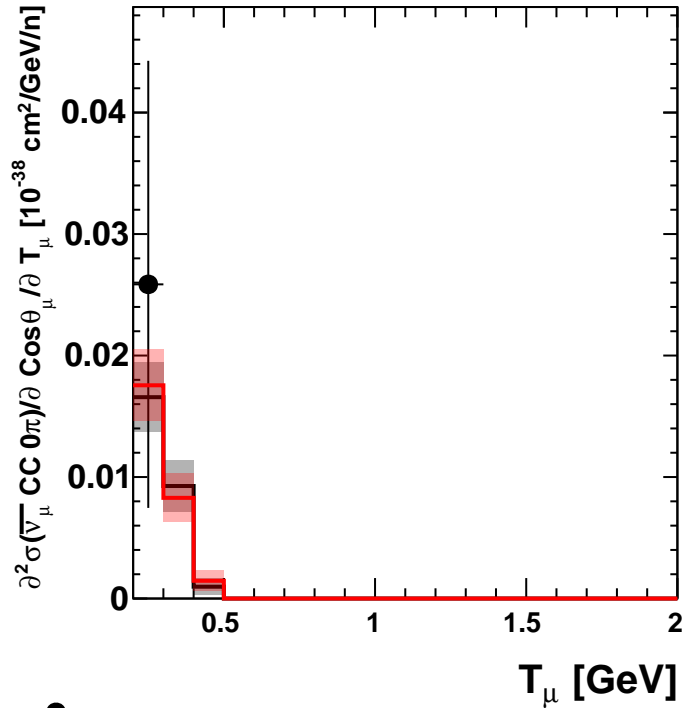
● miniboone_nubarccqe_2013
■ master:G18_02a_00_000:miniboone_rhc $\chi^2 = 0.942/1$ DoF
■ RESFix:G18_02a_00_000:miniboone_rhc $\chi^2 = 0.637/1$ DoF

$\text{Cos}\theta_\mu \in [-0.4; -0.3]$

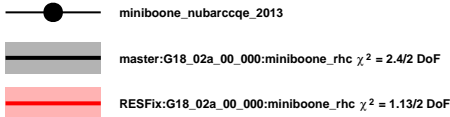
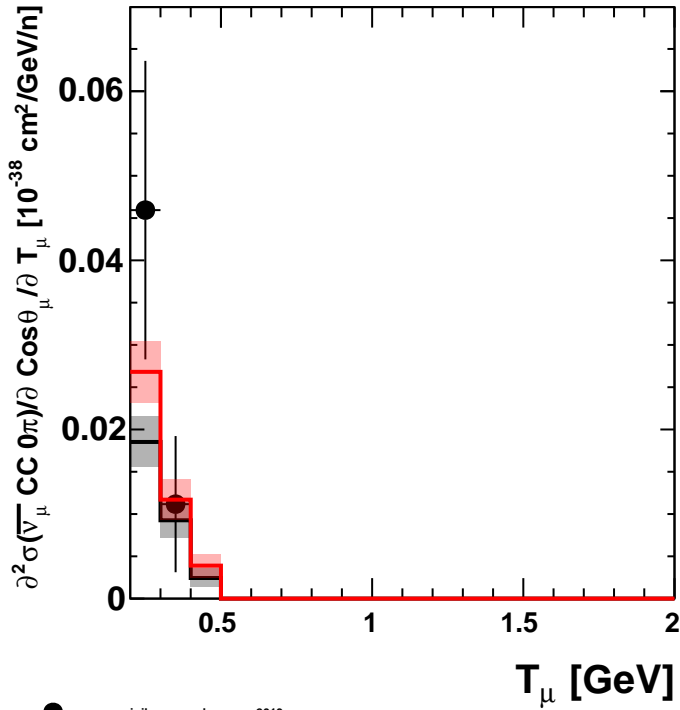
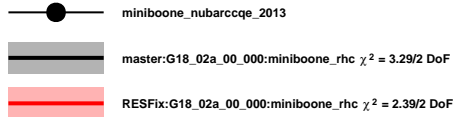
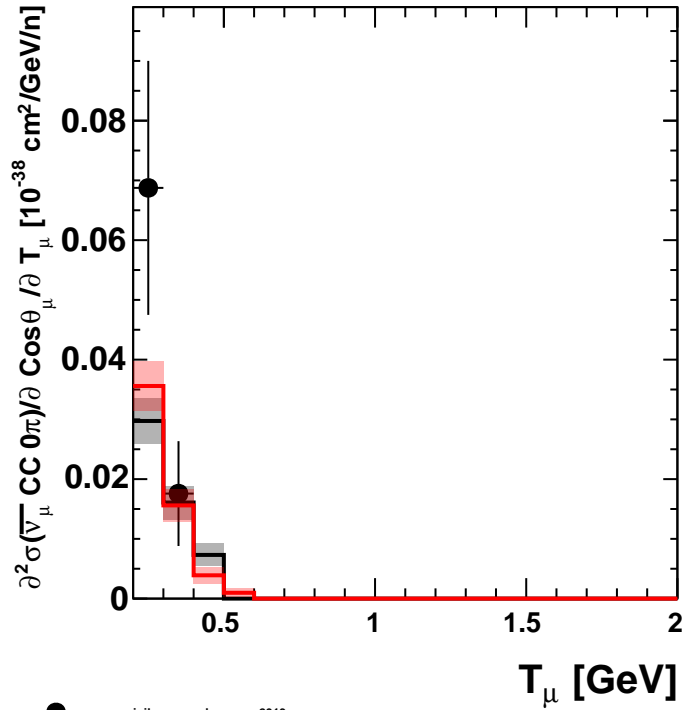
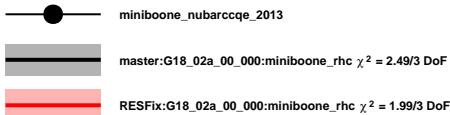
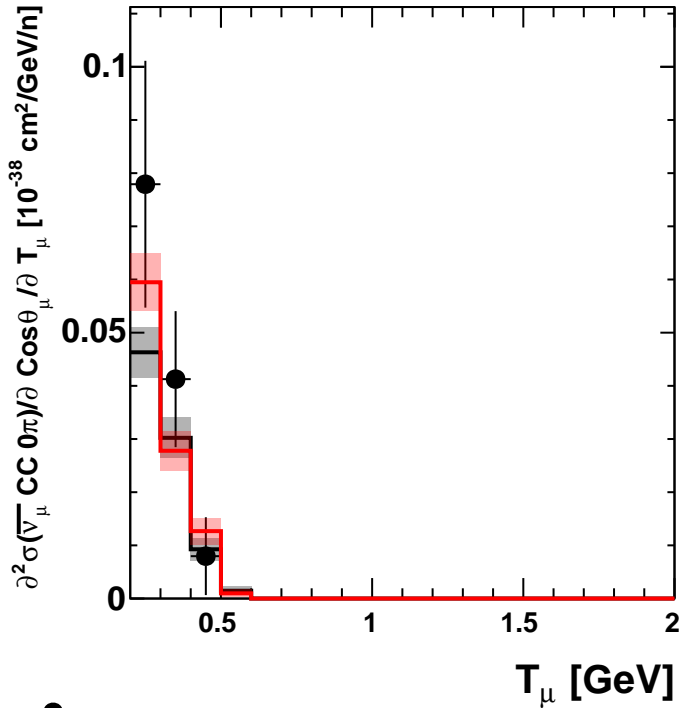
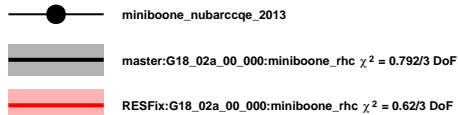
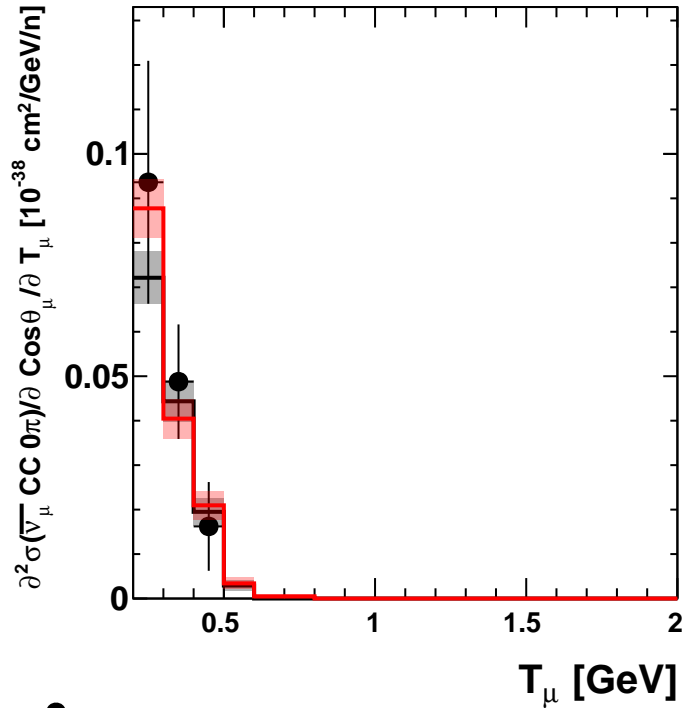


● miniboone_nubarccqe_2013
■ master:G18_02a_00_000:miniboone_rhc $\chi^2 = 0.156/1$ DoF
■ RESFix:G18_02a_00_000:miniboone_rhc $\chi^2 = 0.0827/1$ DoF

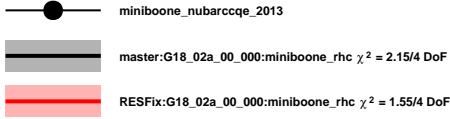
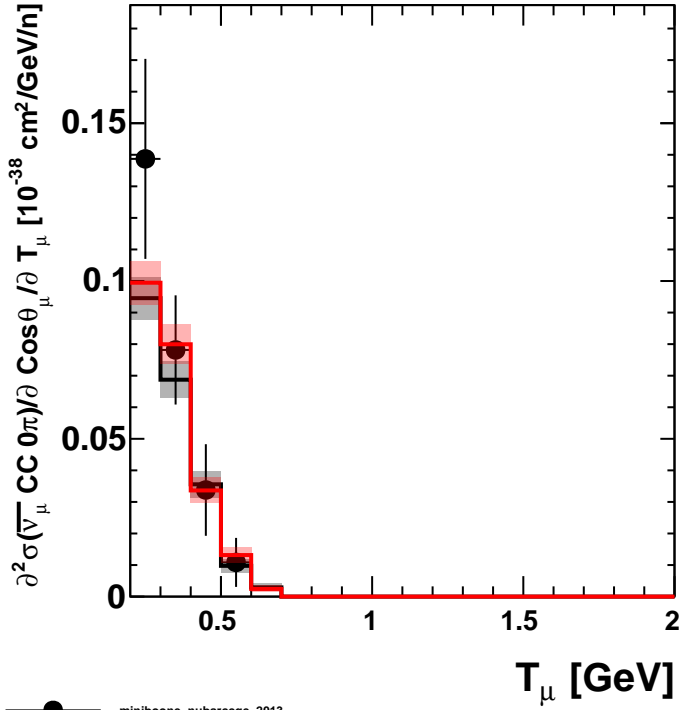
$\text{Cos}\theta_\mu \in [-0.3; -0.2]$



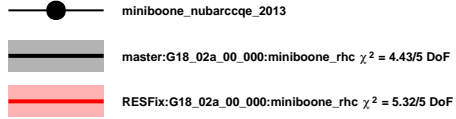
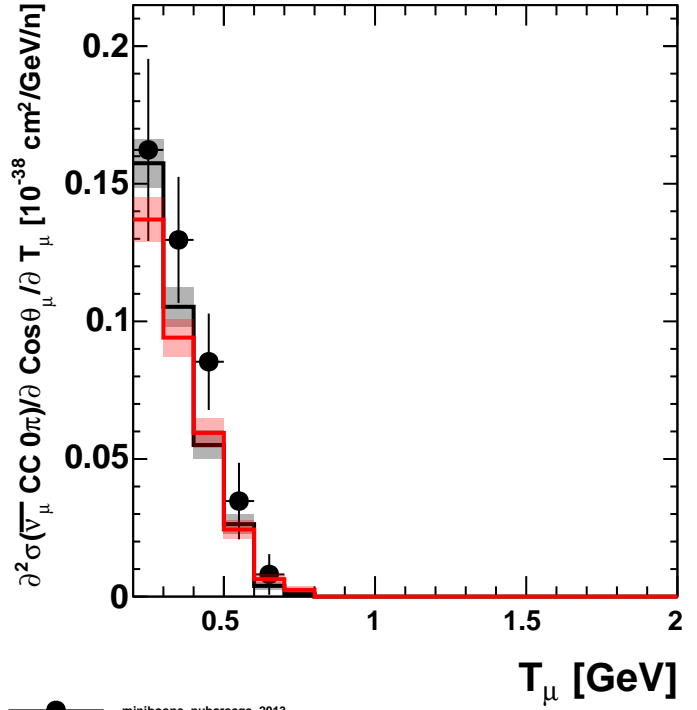
● miniboone_nubarccqe_2013
■ master:G18_02a_00_000:miniboone_rhc $\chi^2 = 0.249/1$ DoF
■ RESFix:G18_02a_00_000:miniboone_rhc $\chi^2 = 0.199/1$ DoF

$\text{Cos}\theta_\mu \in [-0.2; -0.1]$  $\text{Cos}\theta_\mu \in [-0.1; 0]$  $\text{Cos}\theta_\mu \in [0; 0.1]$  $\text{Cos}\theta_\mu \in [0.1; 0.2]$ 

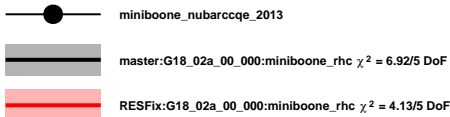
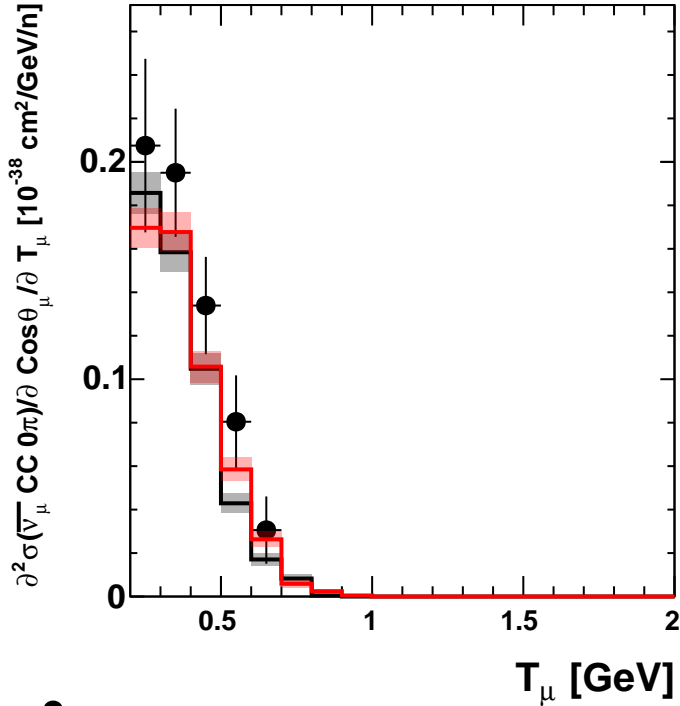
$\text{Cos}\theta_\mu \in [0.2; 0.3]$



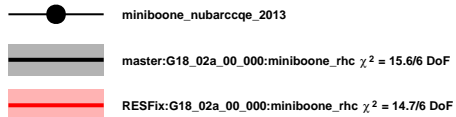
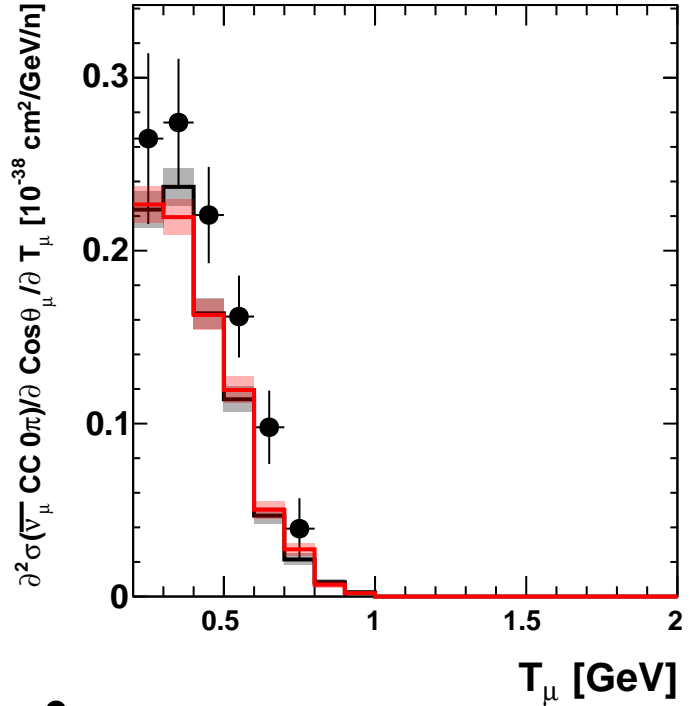
$\text{Cos}\theta_\mu \in [0.3; 0.4]$



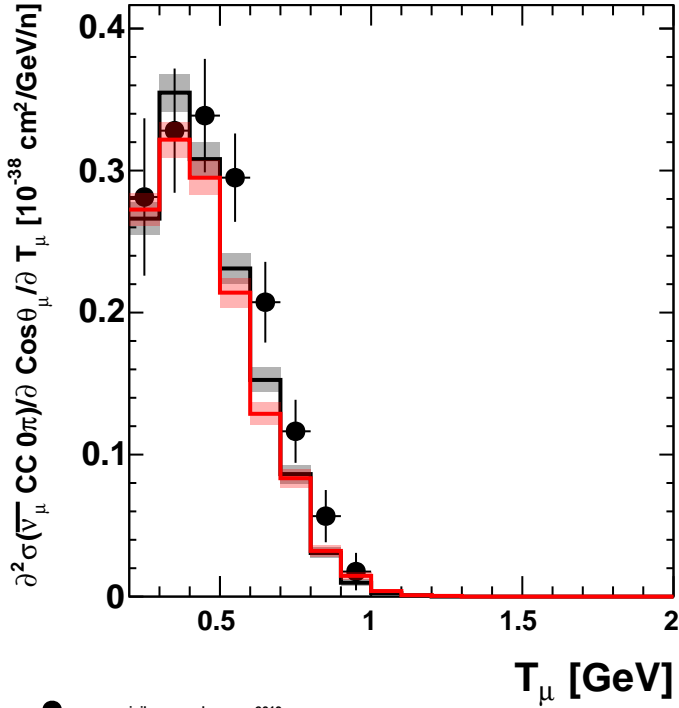
$\text{Cos}\theta_\mu \in [0.4; 0.5]$



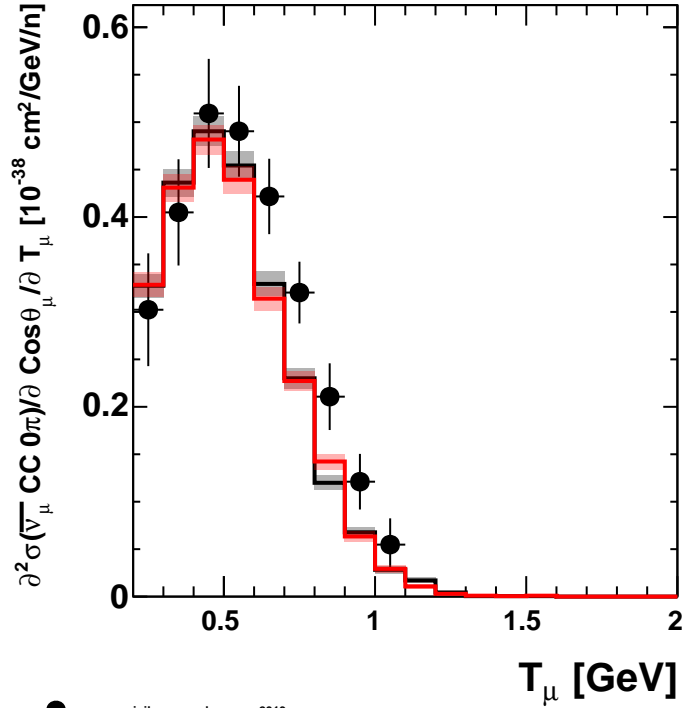
$\text{Cos}\theta_\mu \in [0.5; 0.6]$



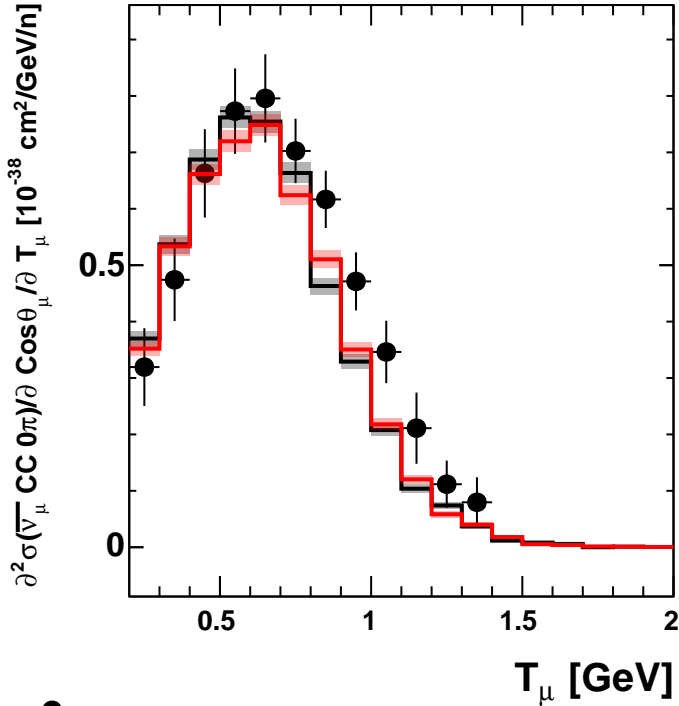
$\text{Cos}\theta_\mu \in [0.6; 0.7]$



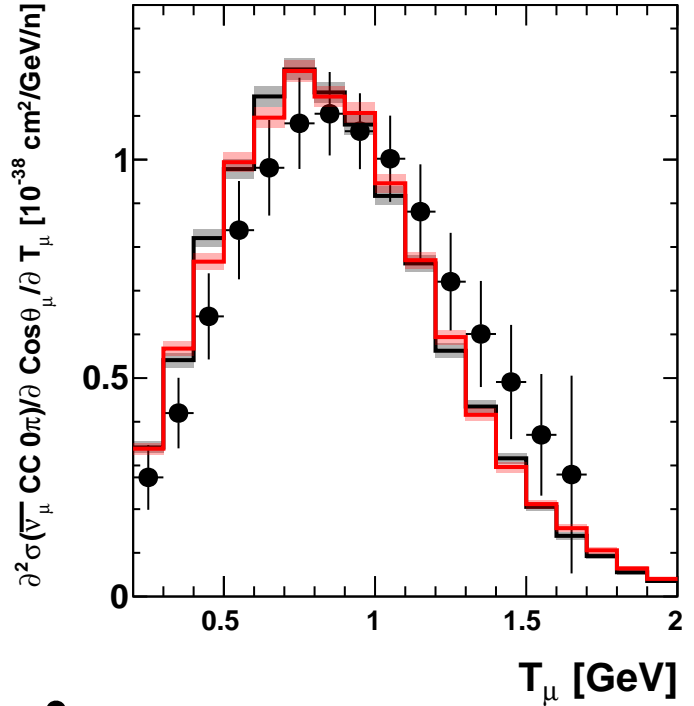
$\text{Cos}\theta_\mu \in [0.7; 0.8]$



$\text{Cos}\theta_\mu \in [0.8; 0.9]$



$\text{Cos}\theta_\mu \in [0.9; 1]$



Dataset:

t2k_nd280_numucc0pi_2015_rps

Models:

master/G18_02a_00_000 $\chi^2 = 58 / 80$ DoF

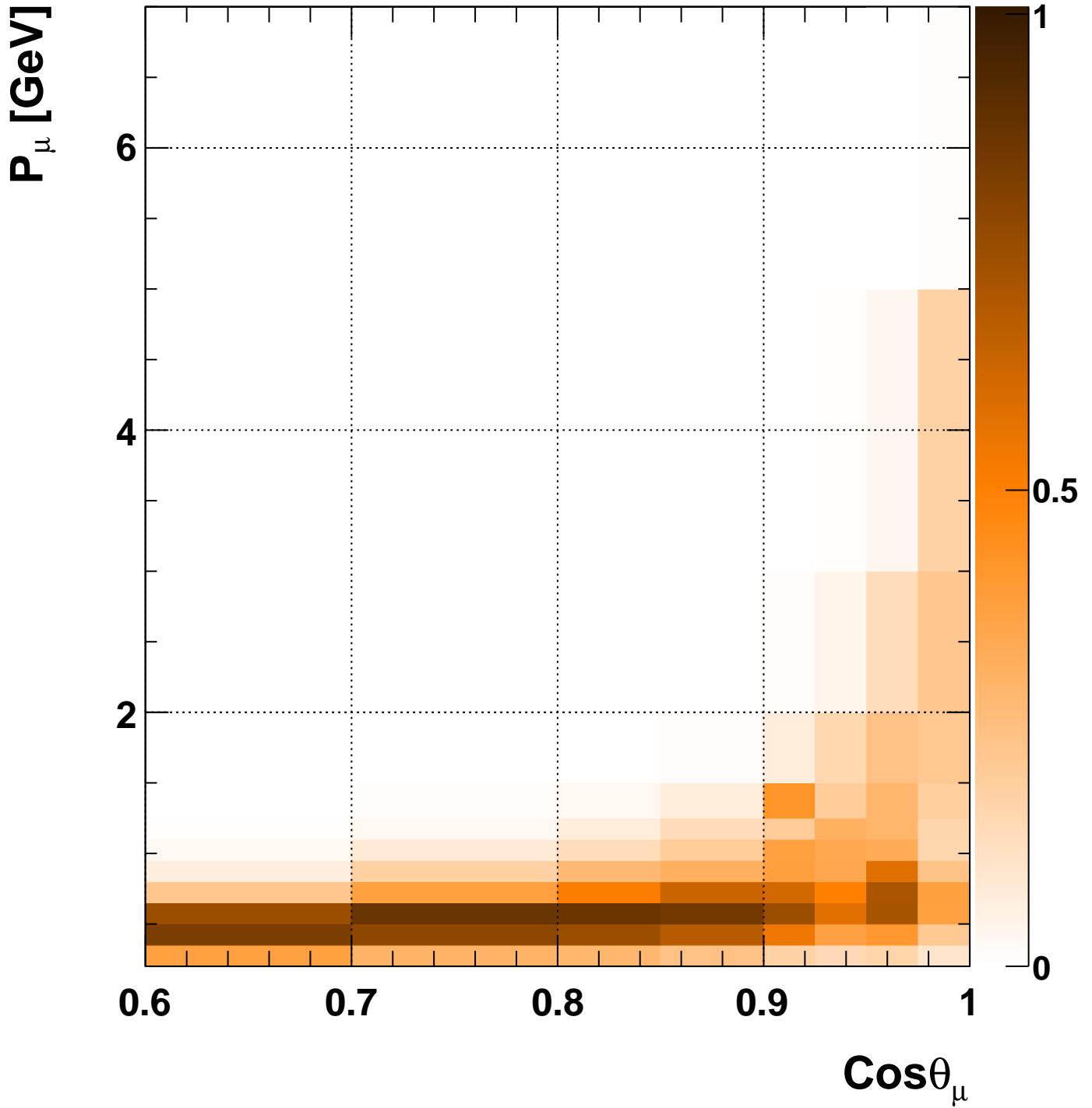
RESFix/G18_02a_00_000 $\chi^2 = 65 / 80$ DoF

Plot:

$$\partial^2 \sigma / \partial \text{Cos} \theta_{\mu} / \partial P_{\mu}$$

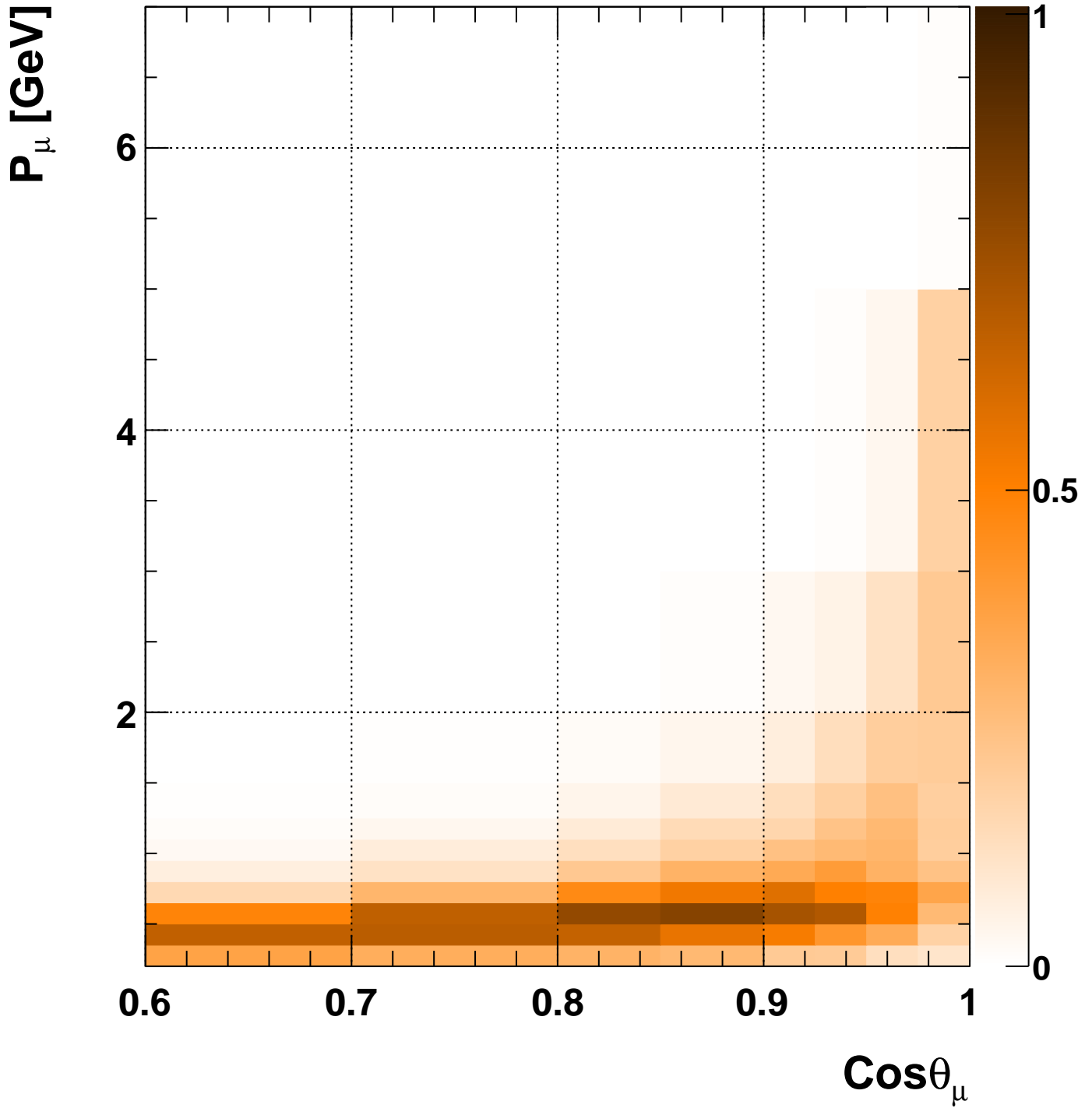
80 DoF, $\chi^2 = 58$ **65**

2019/11/05 13:39:11



$\partial^2\sigma/\partial \text{Cos}\theta_\mu/\partial P_\mu$ [10^{-38} cm²/GeV/n]

Data: t2k_nd280_numucc0pi_2015_rps



$$\frac{\partial^2 \sigma}{\partial \text{Cos}\theta_\mu \partial P_\mu} [10^{-38} \text{ cm}^2/\text{GeV/n}]$$

Pred: master:G18_02a_00_000:t2k_nd280_numu_fhc

t2k_nd280_numucc0pi_2015_rps

VS

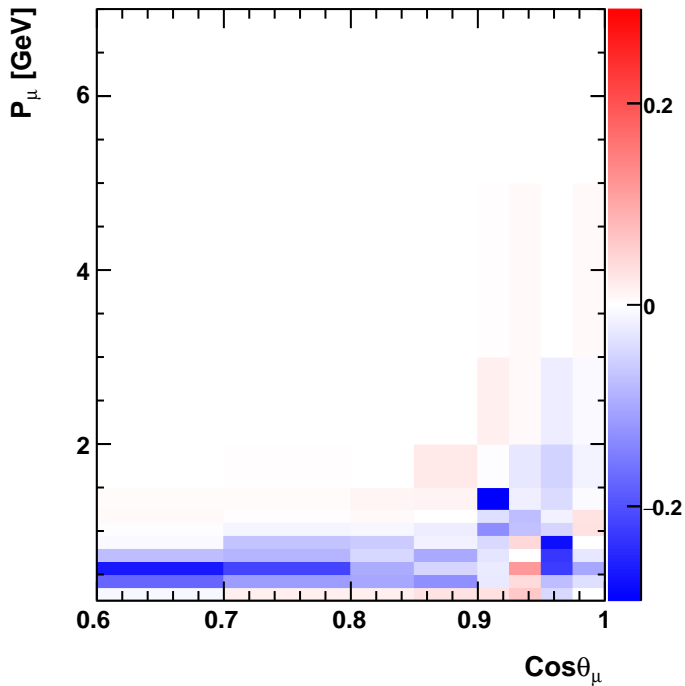
master:G18_02a_00_000:t2k_nd280_numu_fhc

$\partial^2 \sigma / \partial \text{Cos}\theta_\mu / \partial P_\mu$

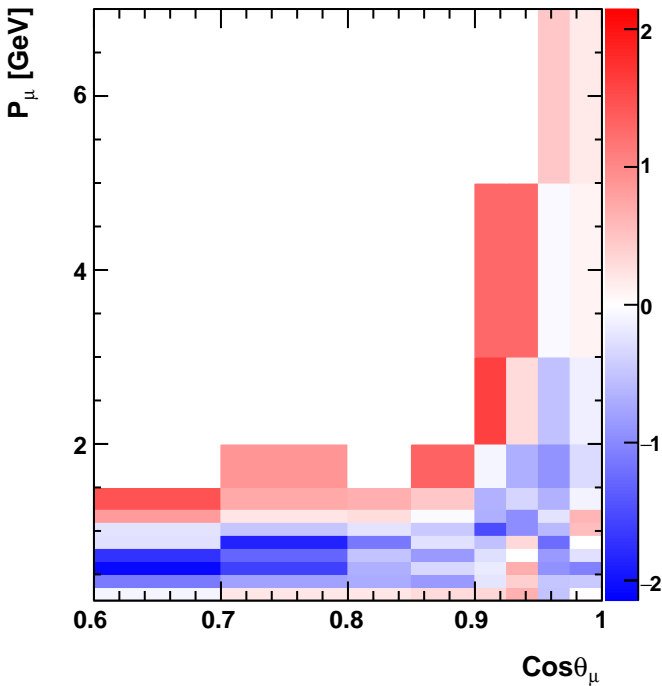
[$10^{-38} \text{ cm}^2/\text{GeV/n}$]

$\chi^2 = 58.0127/80 \text{ DoF}$

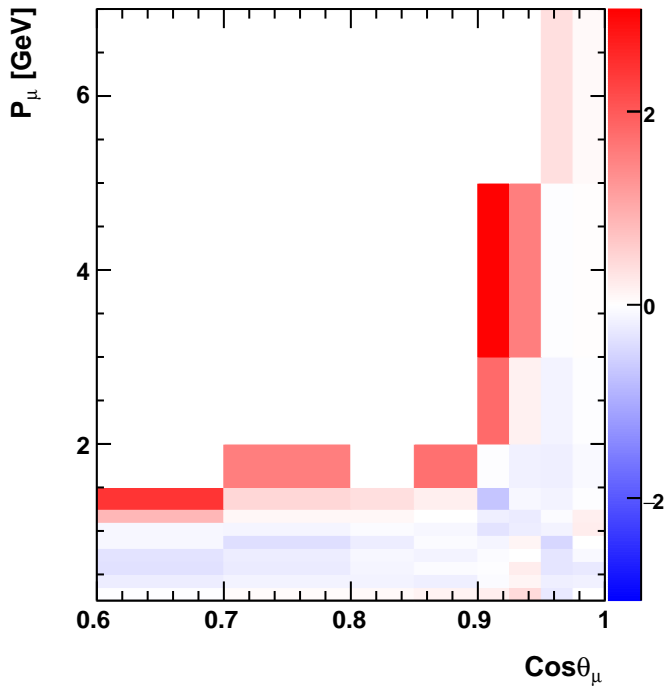
pred - data

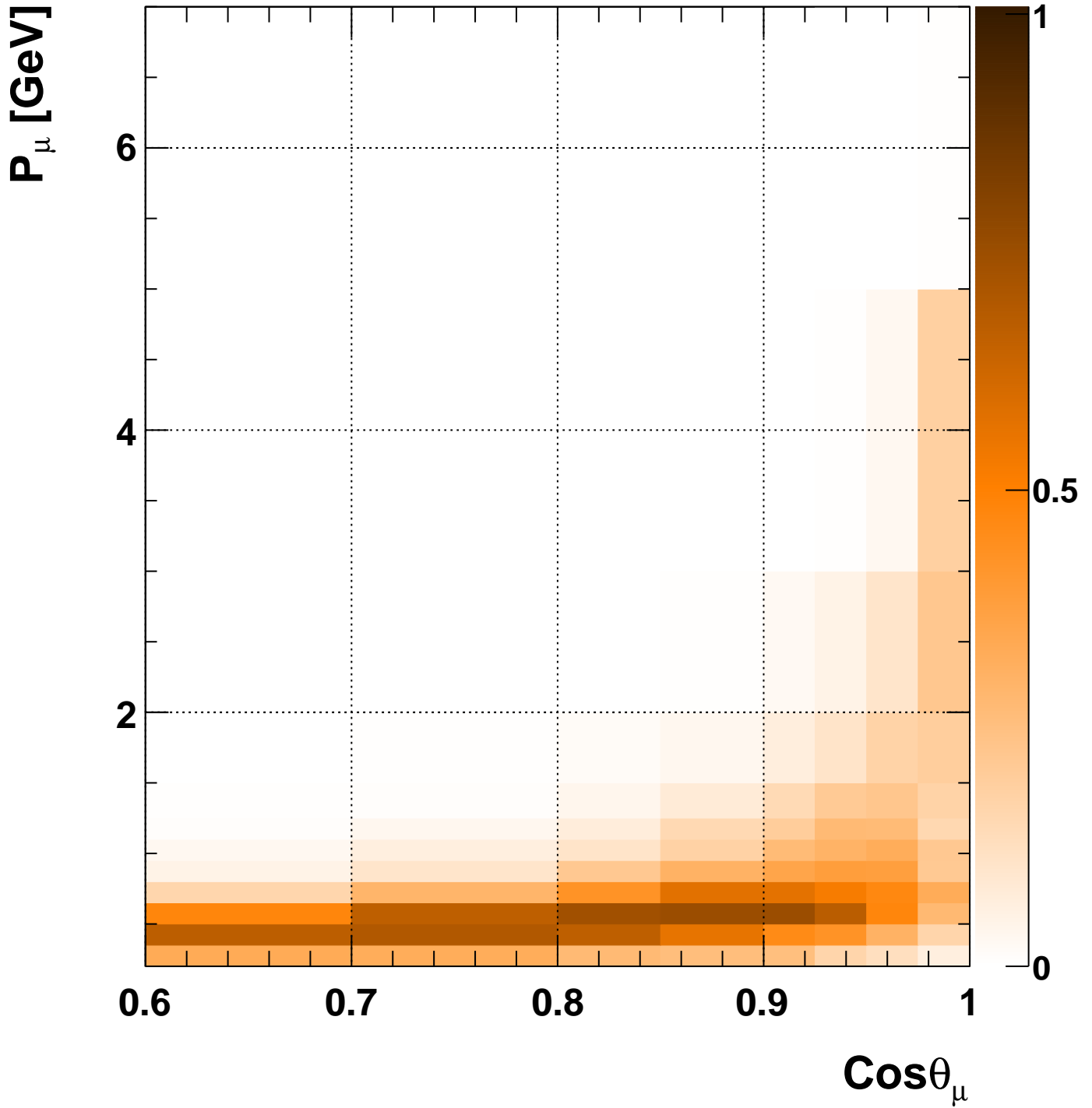


(pred - data)/ σ



(pred - data) / data





$\frac{\partial^2 \sigma}{\partial \text{Cos}\theta_\mu \partial P_\mu} [10^{-38} \text{ cm}^2/\text{GeV/n}]$

Pred: RESFix:G18_02a_00_000:t2k_nd280_numu_fhc

t2k_nd280_numucc0pi_2015_rps

VS

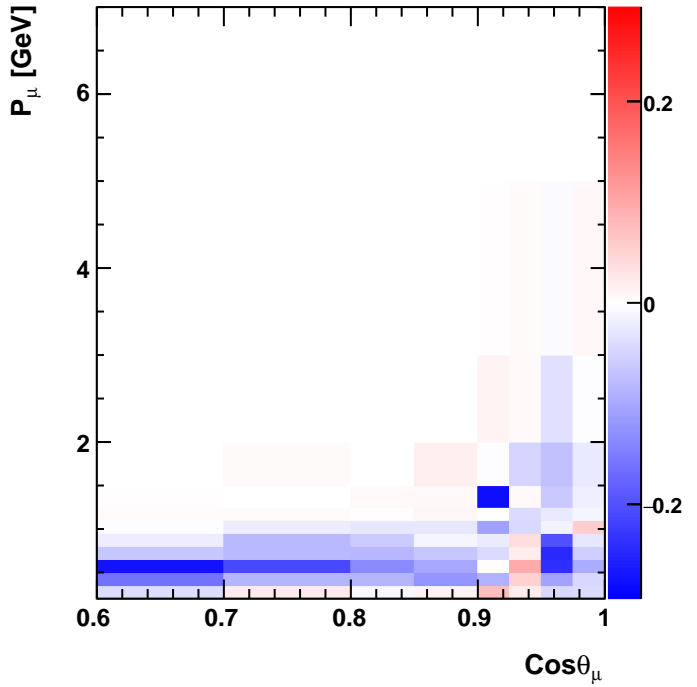
RESFix:G18_02a_00_000:t2k_nd280_numu_fhc

$\partial^2 \sigma / \partial \text{Cos}\theta_\mu / \partial P_\mu$

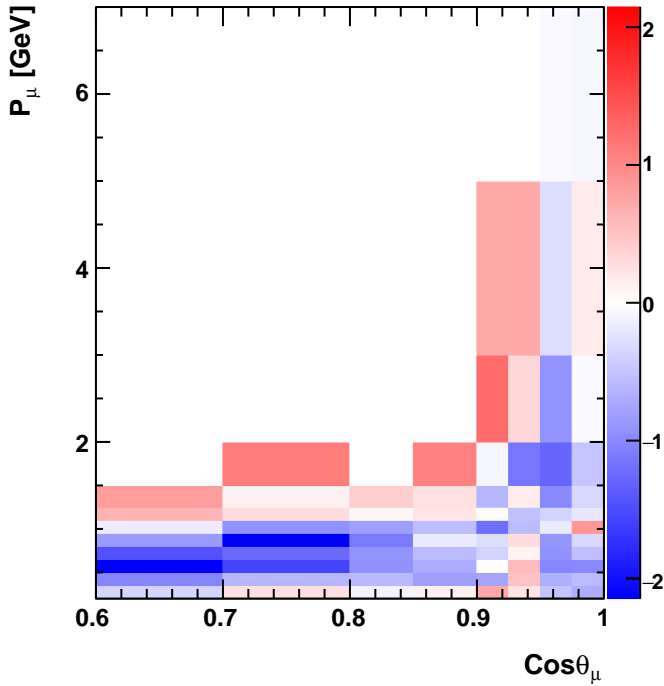
[$10^{-38} \text{ cm}^2/\text{GeV/n}$]

$\chi^2 = 65.0388/80 \text{ DoF}$

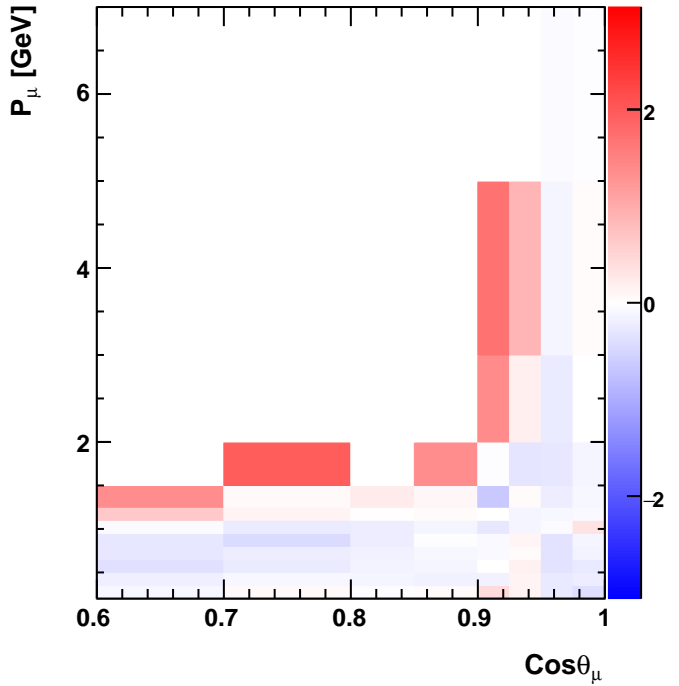
pred - data

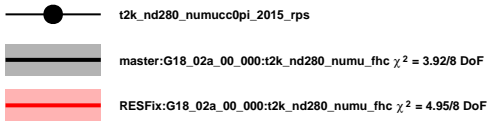
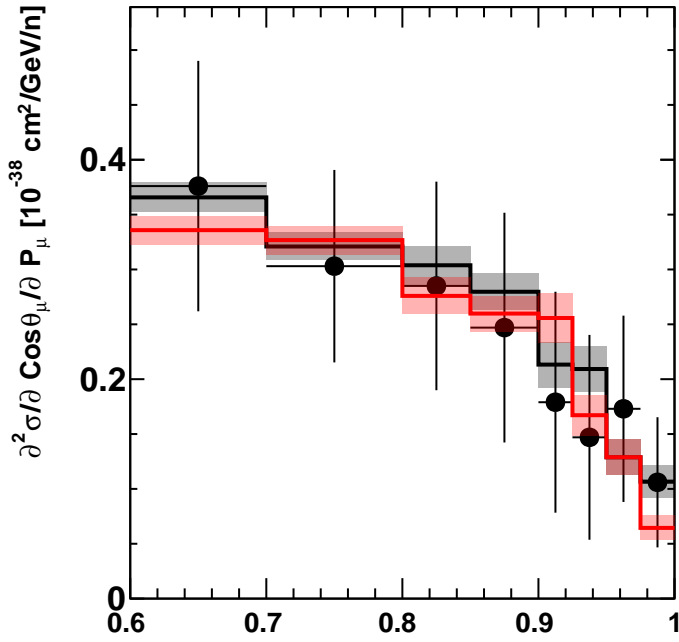
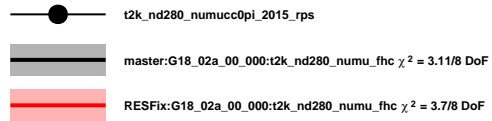
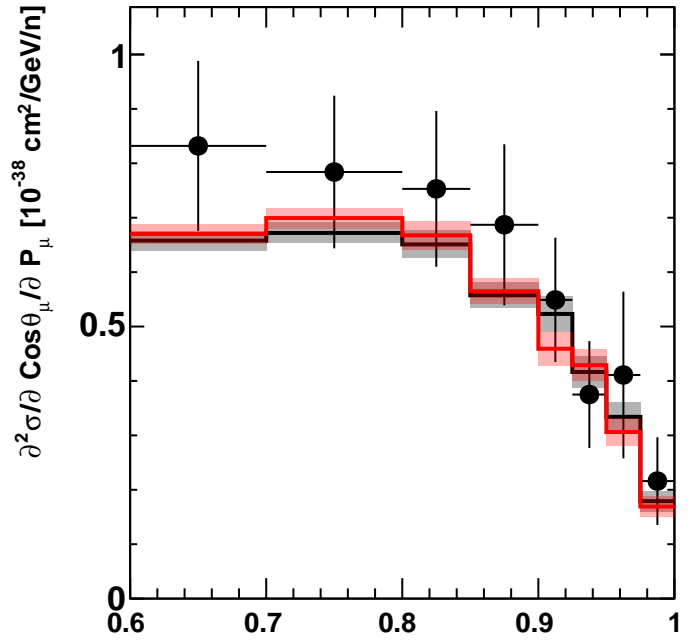
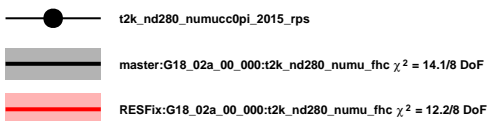
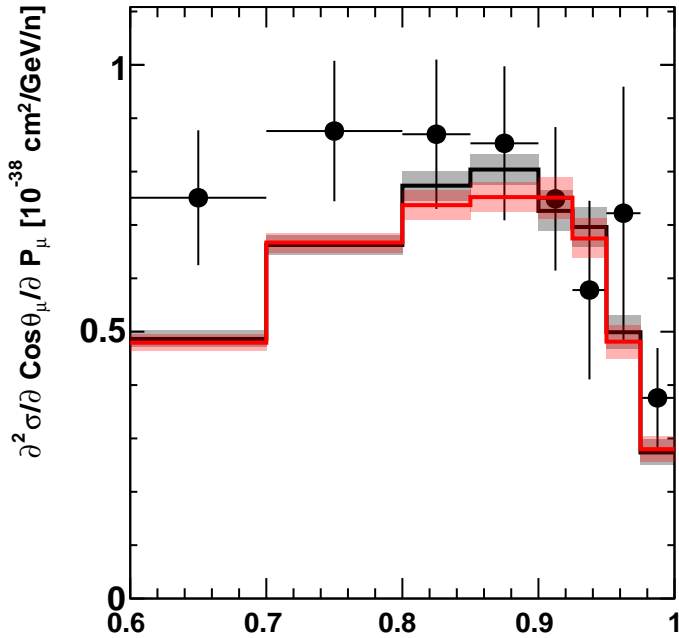
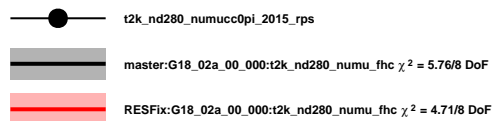
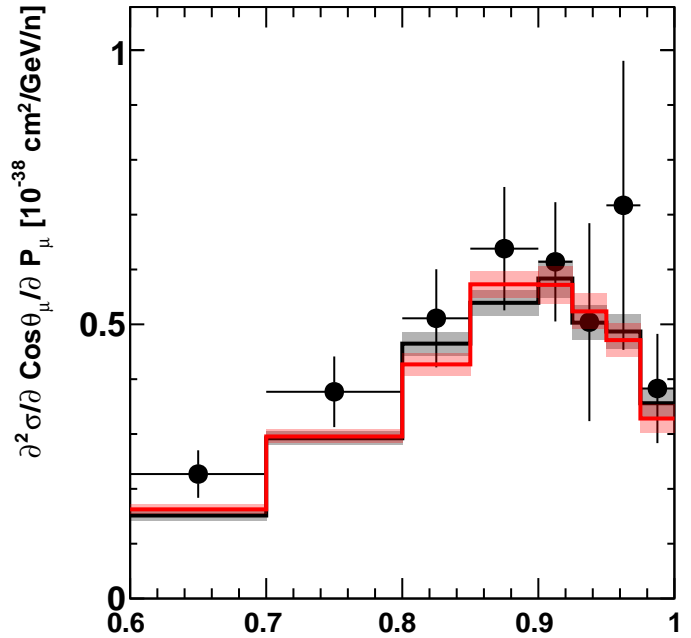


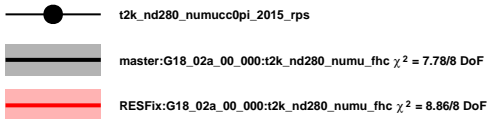
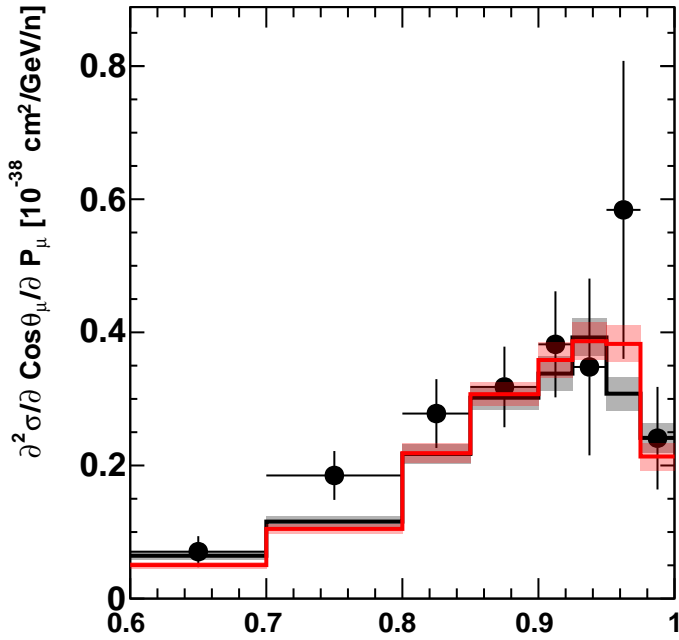
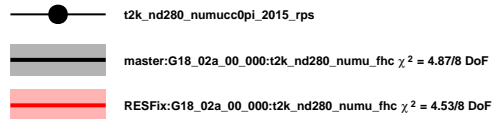
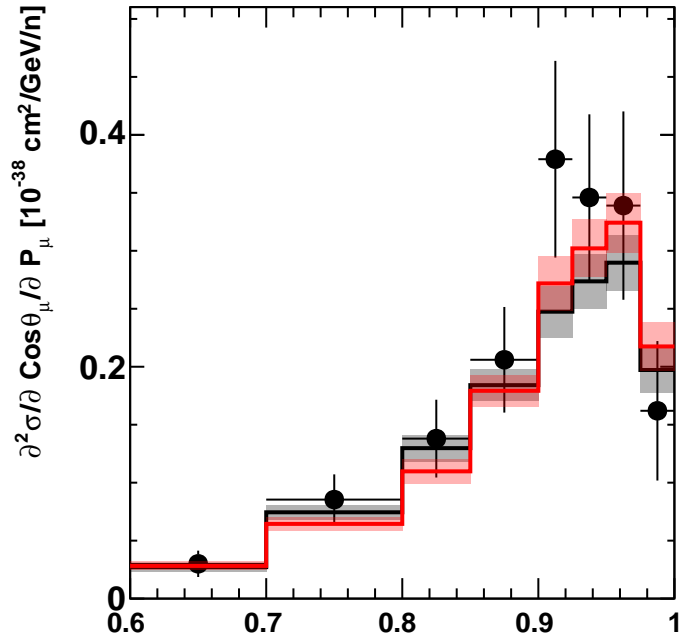
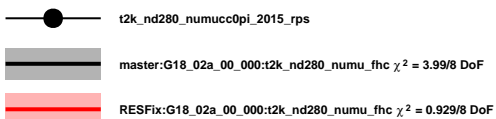
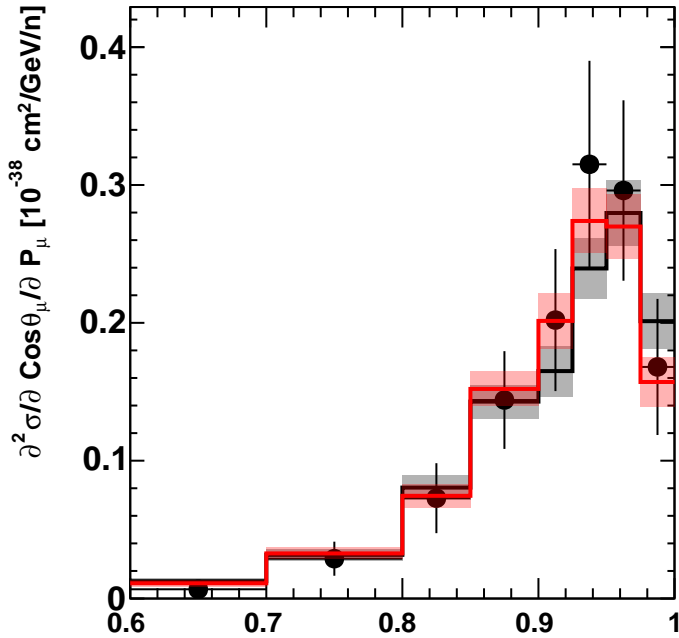
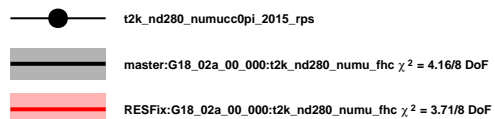
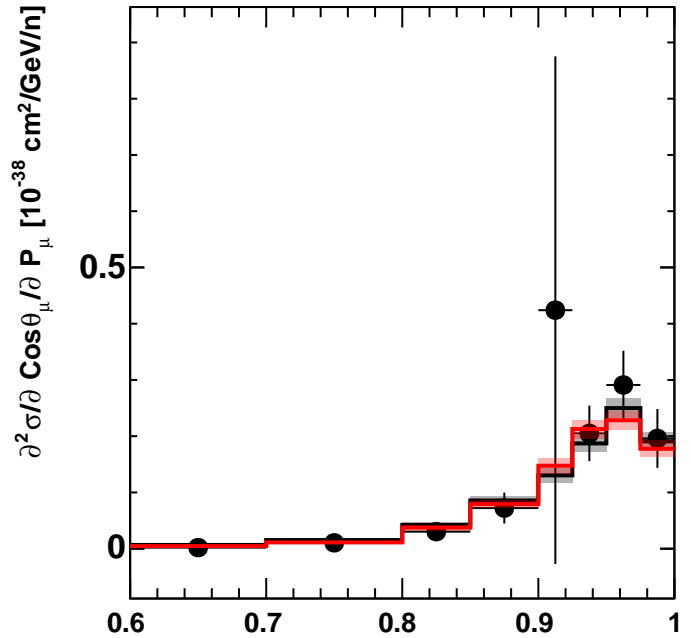
(pred - data)/ σ

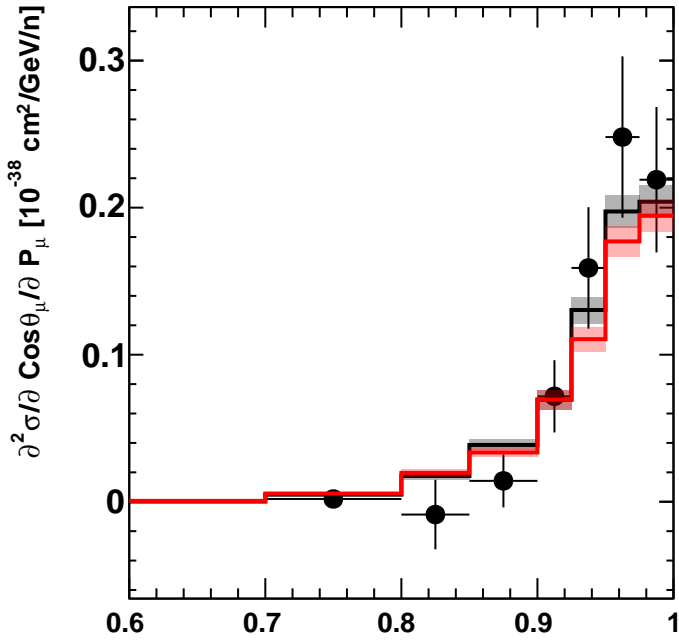


(pred - data) / data



$P_\mu \in [0.2; 0.35] \text{ GeV}$  $\text{Cos}\theta_\mu$ $P_\mu \in [0.35; 0.5] \text{ GeV}$  $\text{Cos}\theta_\mu$ $P_\mu \in [0.5; 0.65] \text{ GeV}$  $\text{Cos}\theta_\mu$ $P_\mu \in [0.65; 0.8] \text{ GeV}$  $\text{Cos}\theta_\mu$

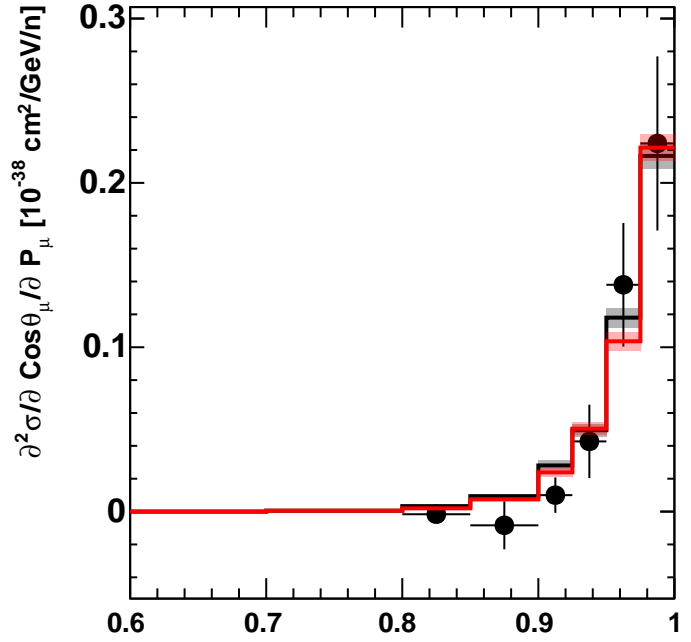
$P_\mu \in [0.8; 0.95] \text{ GeV}$  $\text{Cos}\theta_\mu$ $P_\mu \in [0.95; 1.1] \text{ GeV}$  $\text{Cos}\theta_\mu$ $P_\mu \in [1.1; 1.25] \text{ GeV}$  $\text{Cos}\theta_\mu$ $P_\mu \in [1.25; 1.5] \text{ GeV}$  $\text{Cos}\theta_\mu$

$P_\mu \in [1.5; 2] \text{ GeV}$ 

● t2k_nd280_numucc0pi_2015_rps

■ master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 6.74/6$ DoF

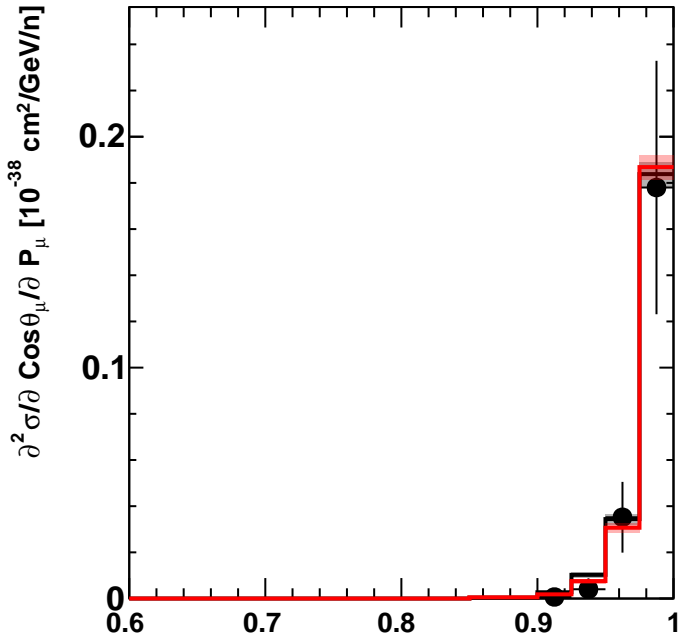
■ RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 9.21/6$ DoF

 $\text{Cos} \theta_\mu$ $P_\mu \in [2; 3] \text{ GeV}$ 

● t2k_nd280_numucc0pi_2015_rps

■ master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 8.43/4$ DoF

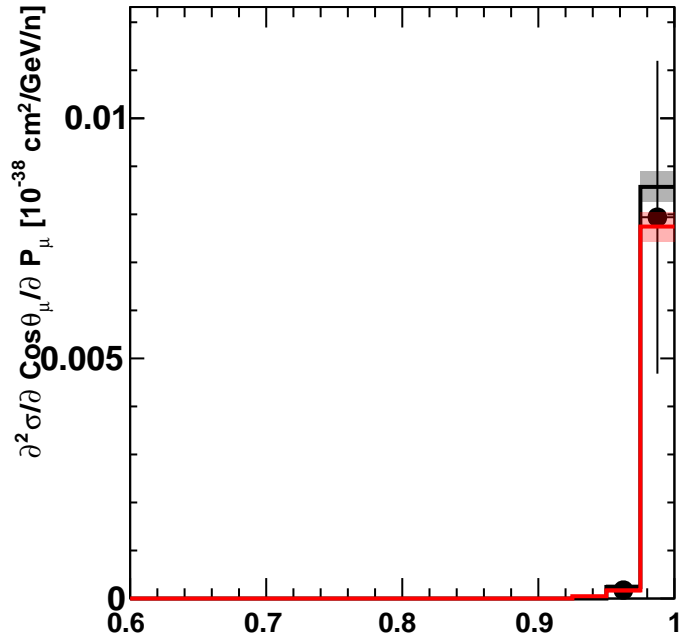
■ RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 7.76/4$ DoF

 $\text{Cos} \theta_\mu$ $P_\mu \in [3; 5] \text{ GeV}$ 

● t2k_nd280_numucc0pi_2015_rps

■ master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 4.13/4$ DoF

■ RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.55/4$ DoF

 $\text{Cos} \theta_\mu$ $P_\mu \in [5; 30] \text{ GeV}$ 

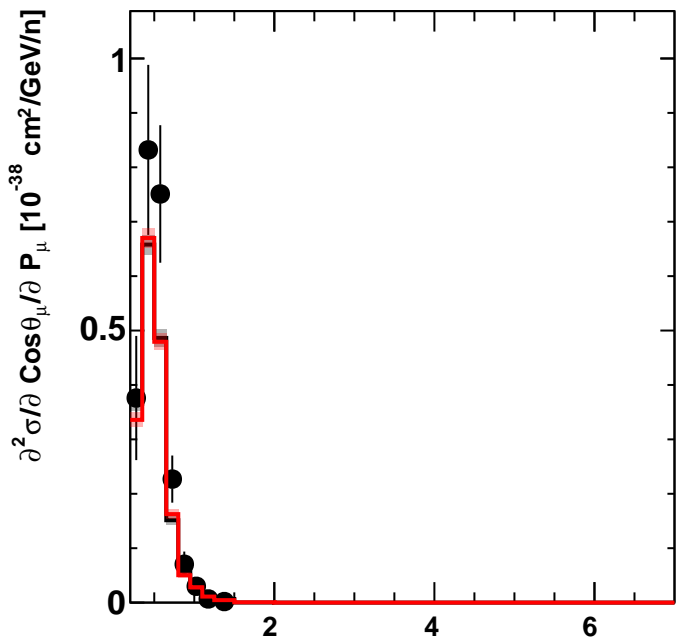
● t2k_nd280_numucc0pi_2015_rps

■ master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 0.231/2$ DoF

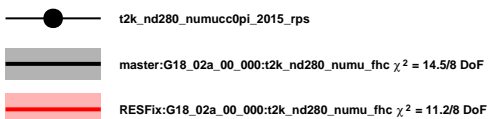
■ RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 0.00403/2$ DoF

 $\text{Cos} \theta_\mu$

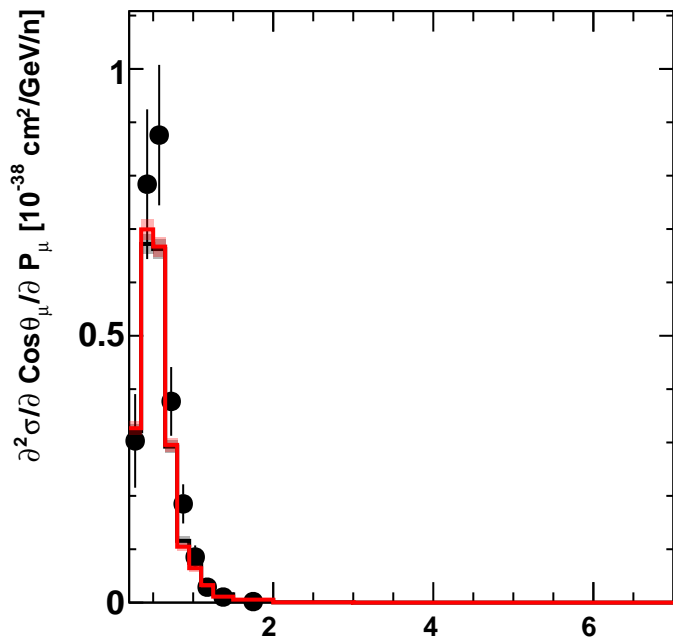
$\text{Cos}\theta_{\mu} \in [0.6; 0.7]$



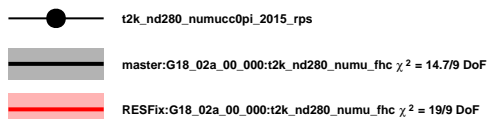
P_{μ} [GeV]



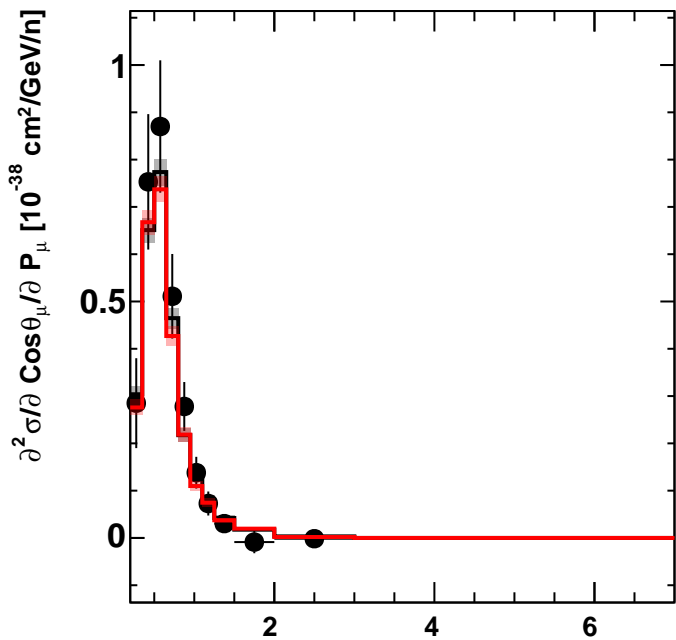
$\text{Cos}\theta_{\mu} \in [0.7; 0.8]$



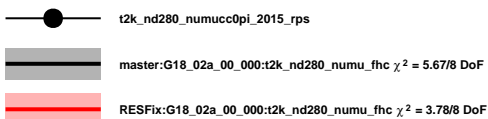
P_{μ} [GeV]



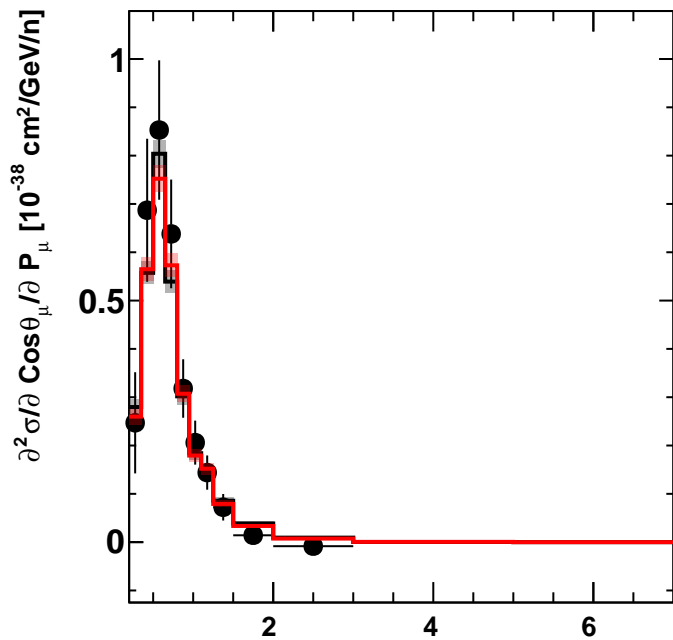
$\text{Cos}\theta_{\mu} \in [0.8; 0.85]$



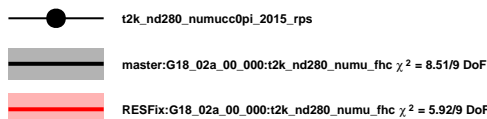
P_{μ} [GeV]

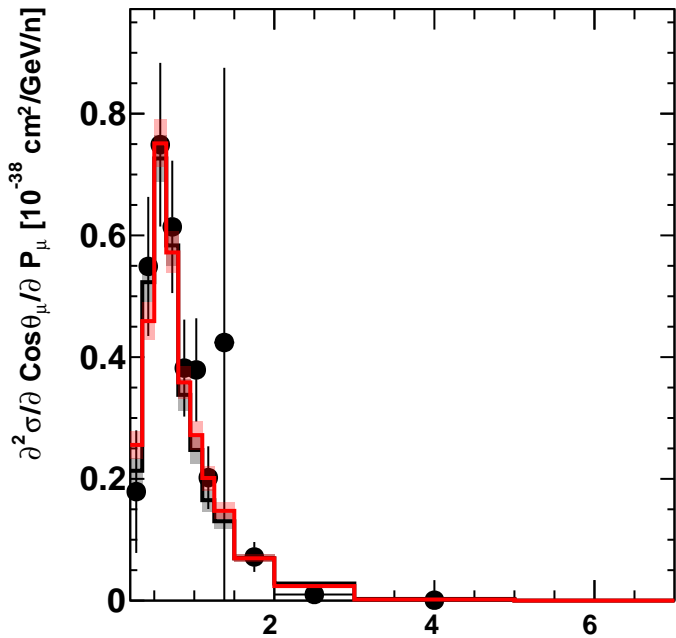
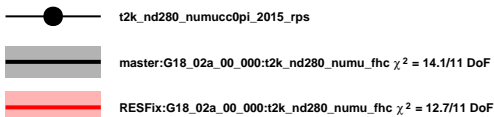
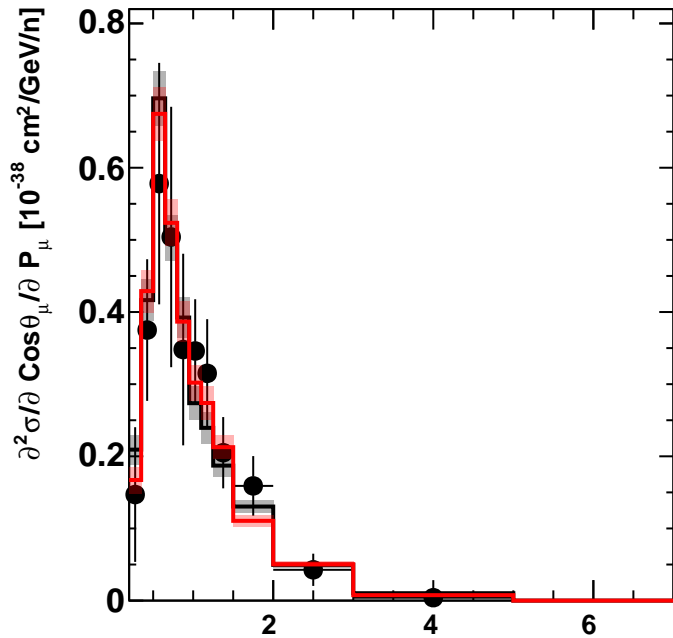
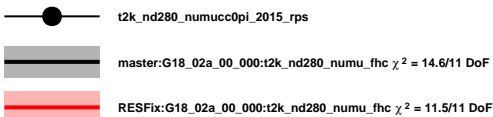
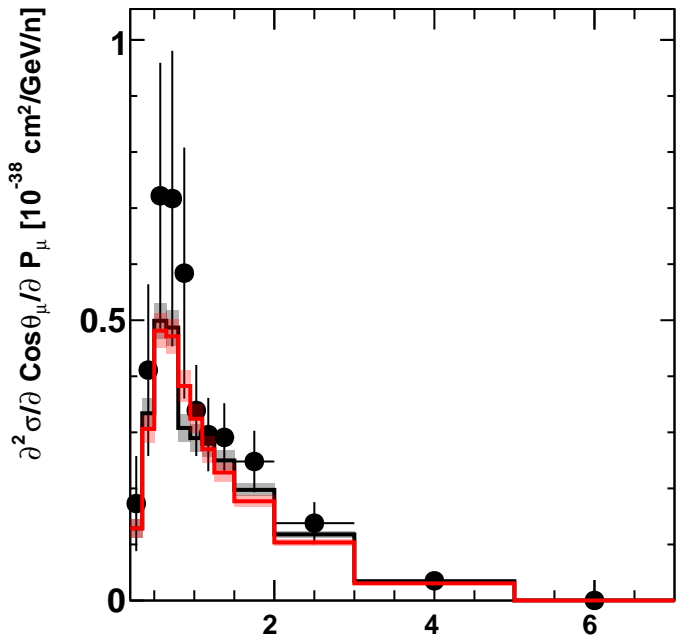
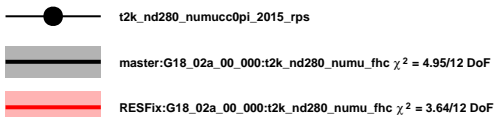
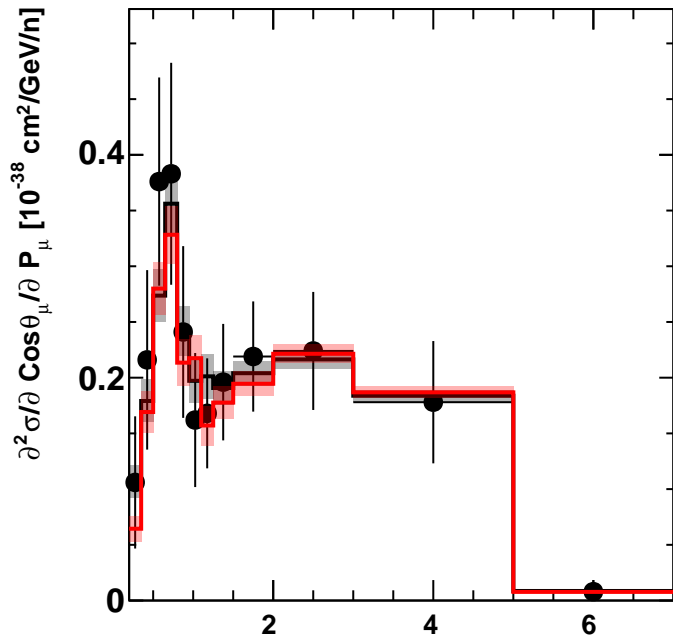
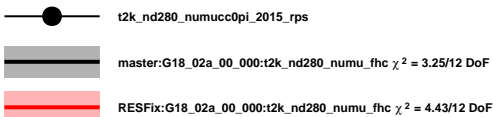


$\text{Cos}\theta_{\mu} \in [0.85; 0.9]$

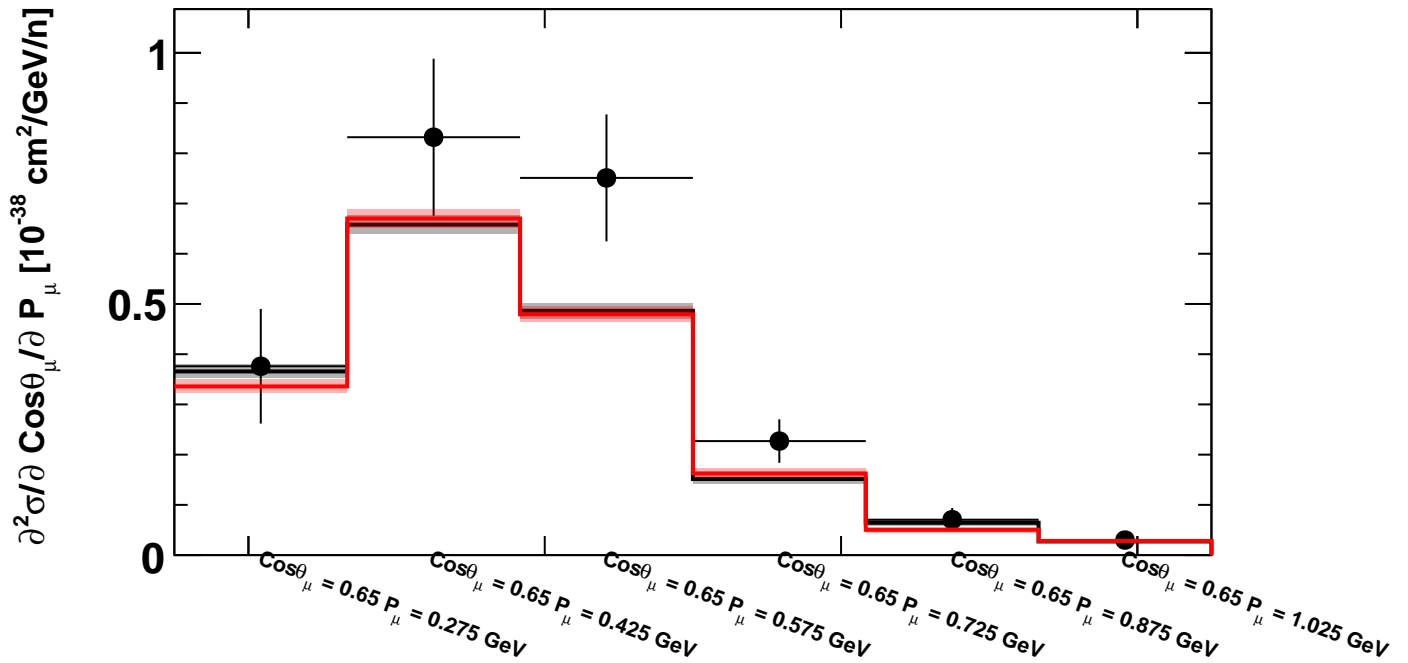


P_{μ} [GeV]



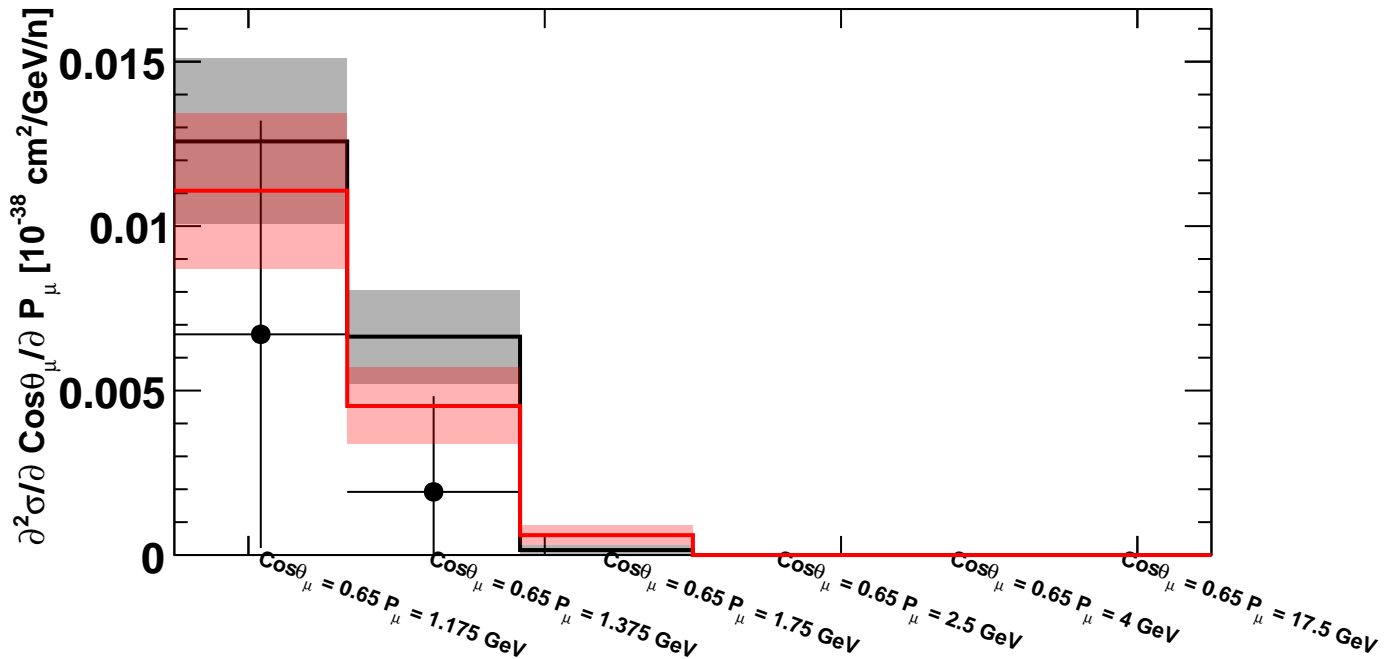
$\text{Cos}\theta_\mu \in [0.9; 0.925]$  P_μ [GeV] $\text{Cos}\theta_\mu \in [0.925; 0.95]$  P_μ [GeV] $\text{Cos}\theta_\mu \in [0.95; 0.975]$  P_μ [GeV] $\text{Cos}\theta_\mu \in [0.975; 1]$  P_μ [GeV]

Bin \in [0; 5]



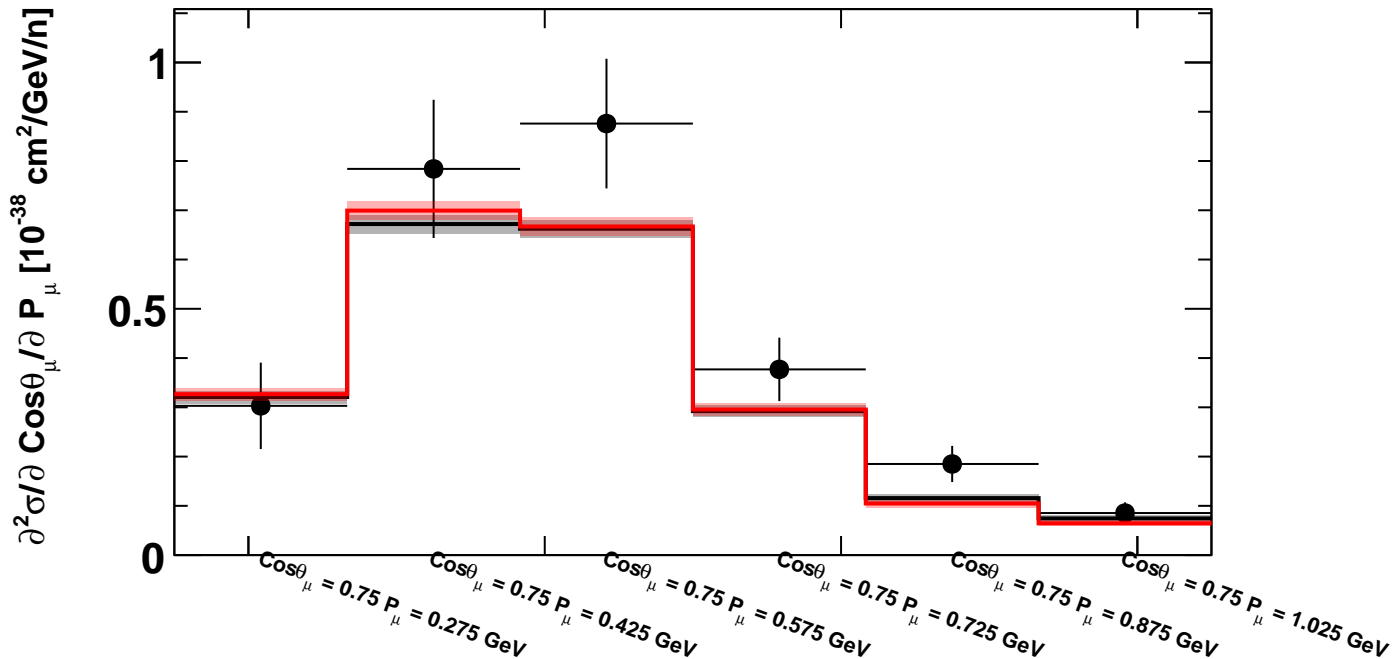
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 11.6/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 9.77/6$ DoF

Bin \in [6; 11]



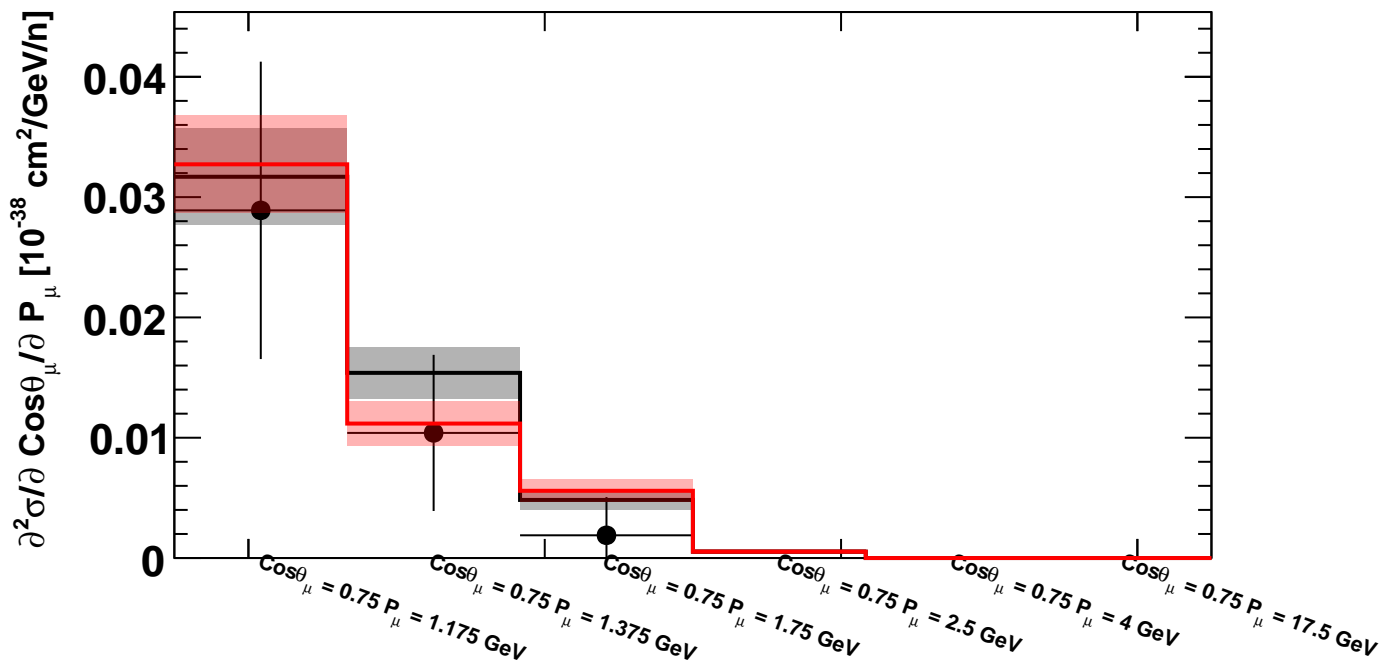
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.17/2$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 0.77/2$ DoF

Bin \in [12; 17]



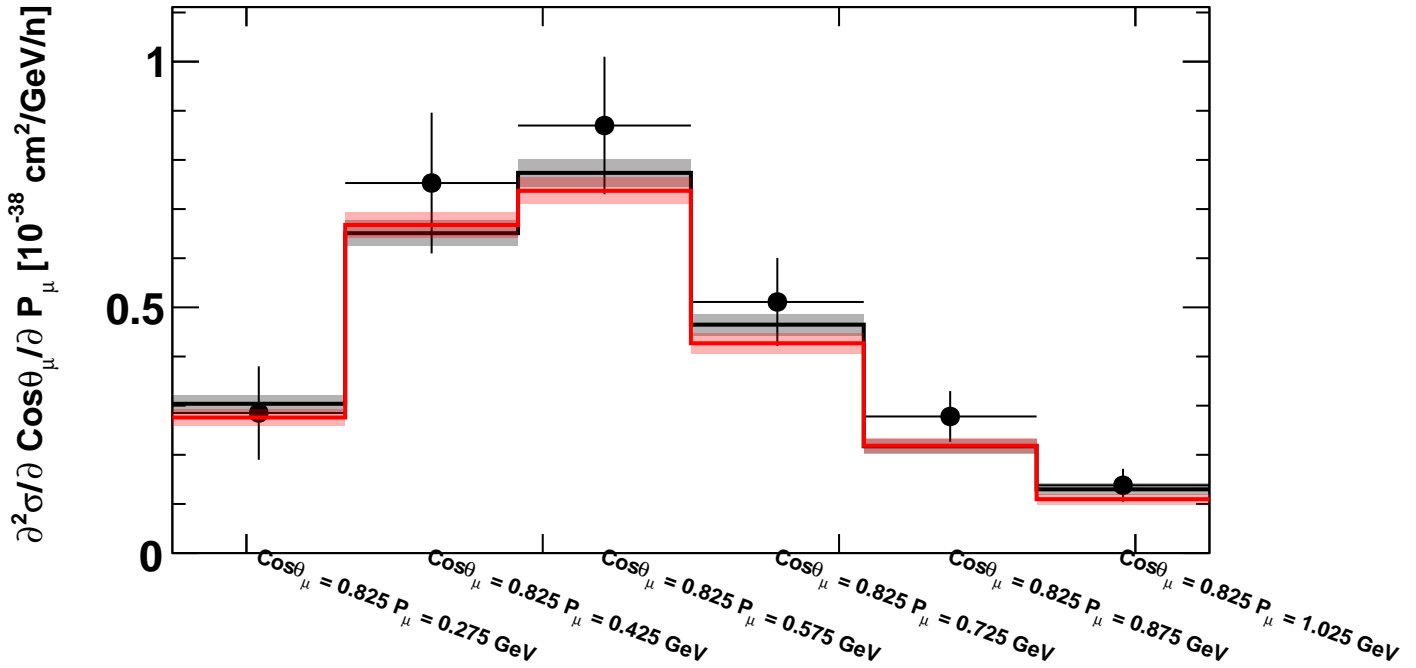
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 13/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 14.9/6$ DoF

Bin \in [18; 23]



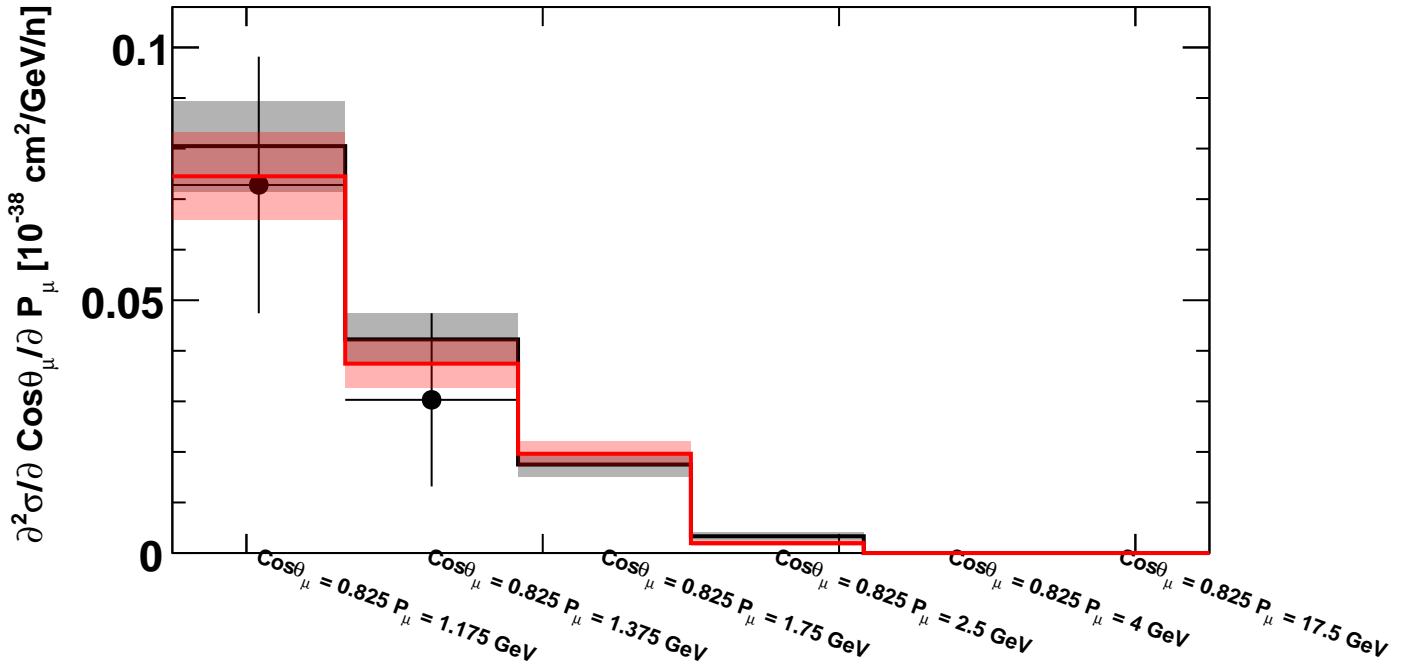
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 1.06/3$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.19/3$ DoF

Bin \in [24; 29]



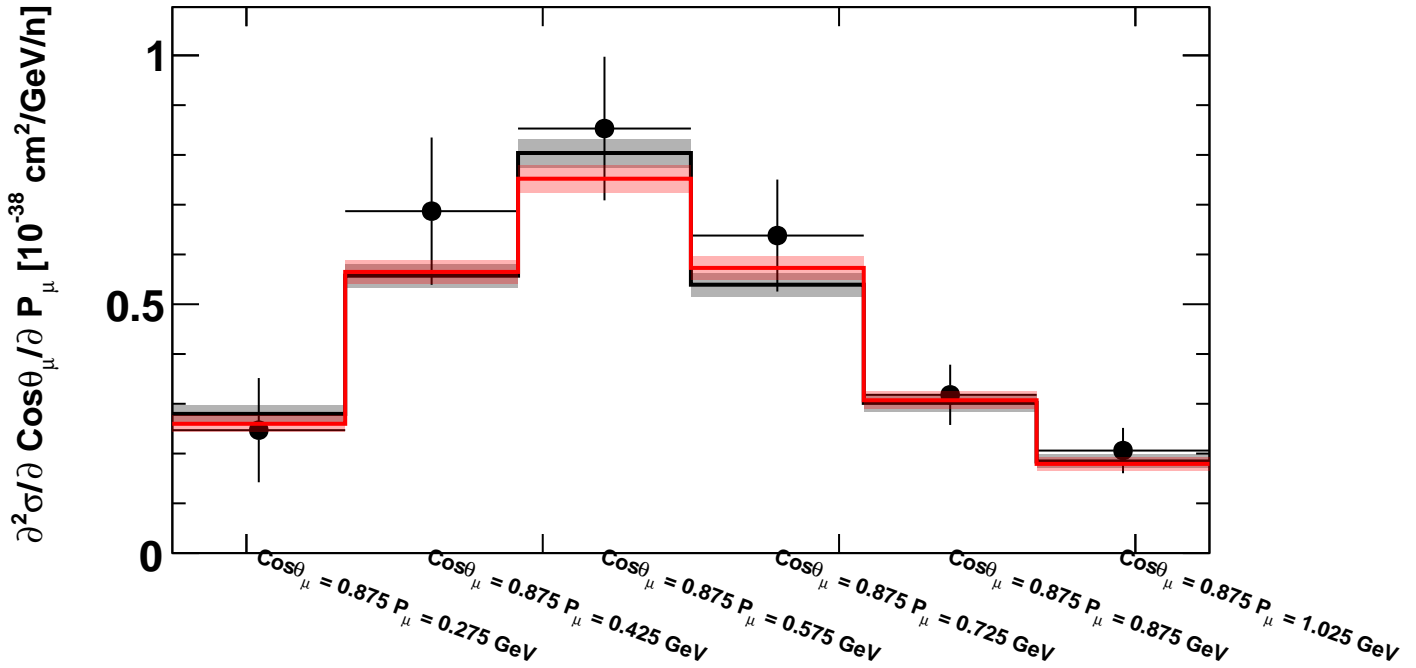
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 3.98/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.03/6$ DoF

Bin \in [30; 35]



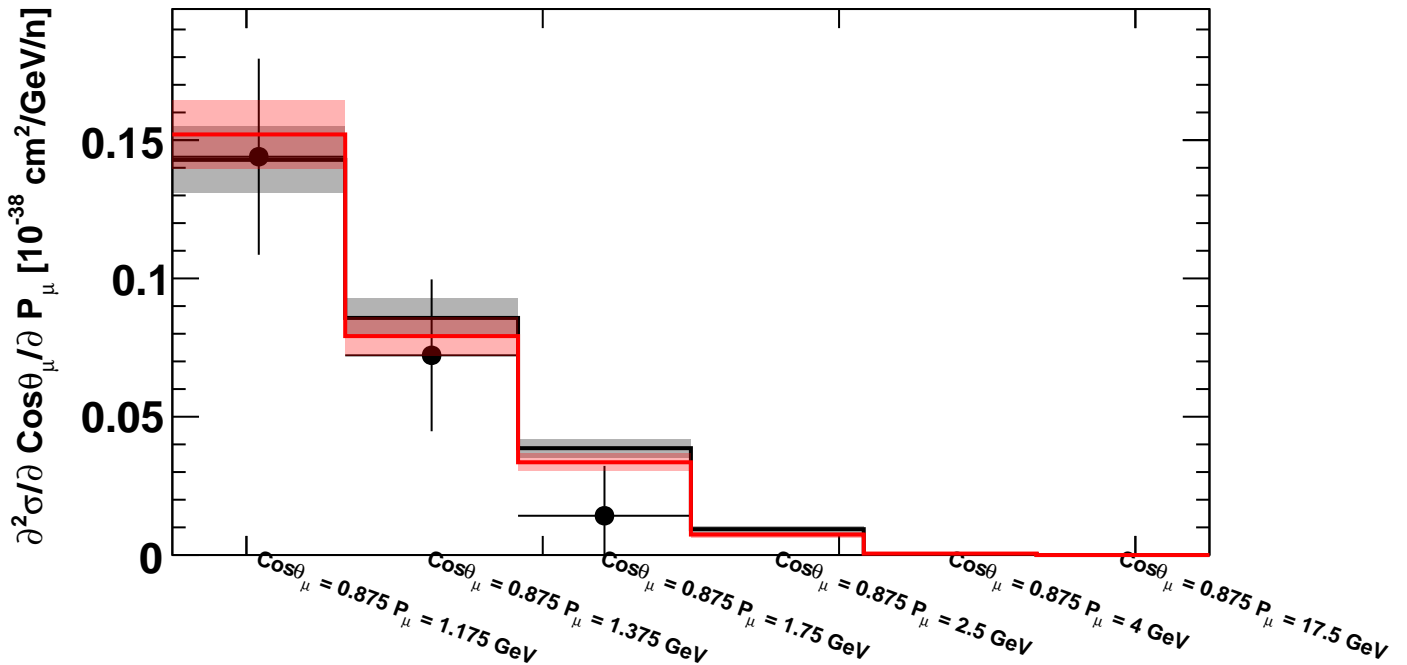
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 0.553/2$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 0.295/2$ DoF

Bin \in [36; 41]



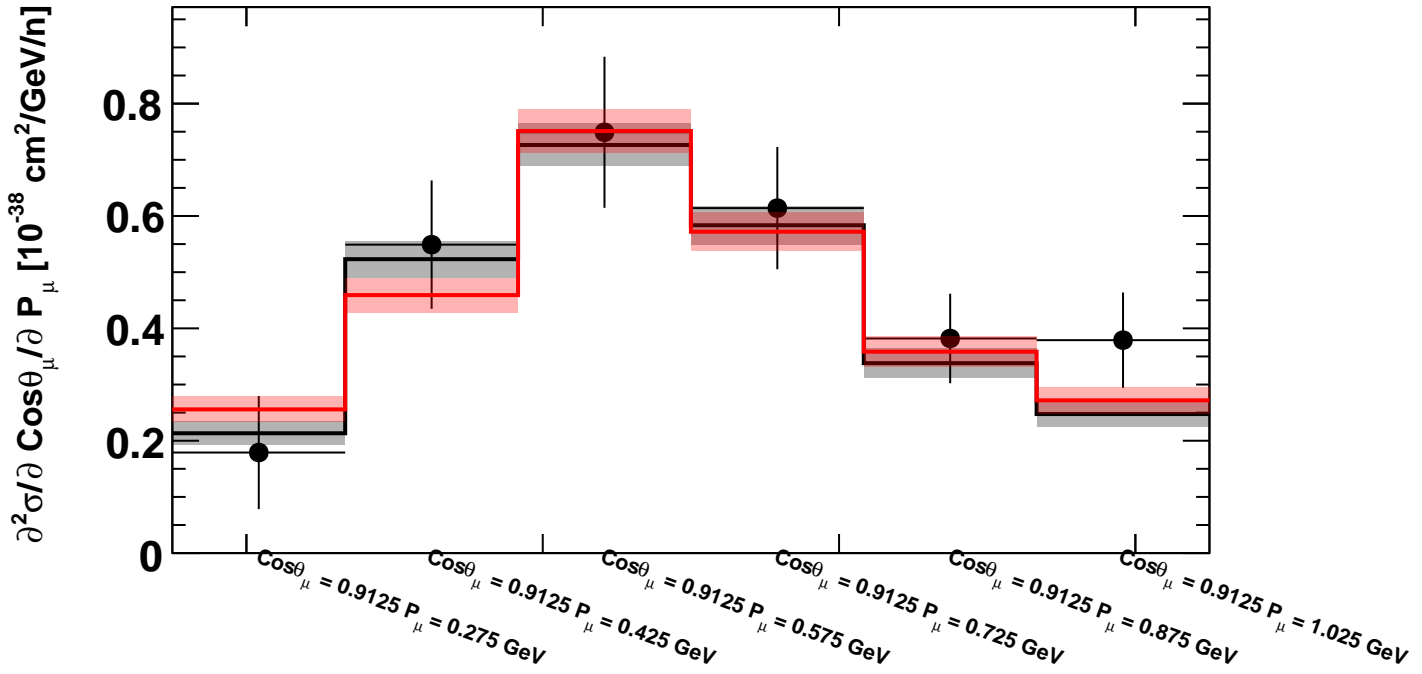
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 4.92/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.64/6$ DoF

Bin \in [42; 47]



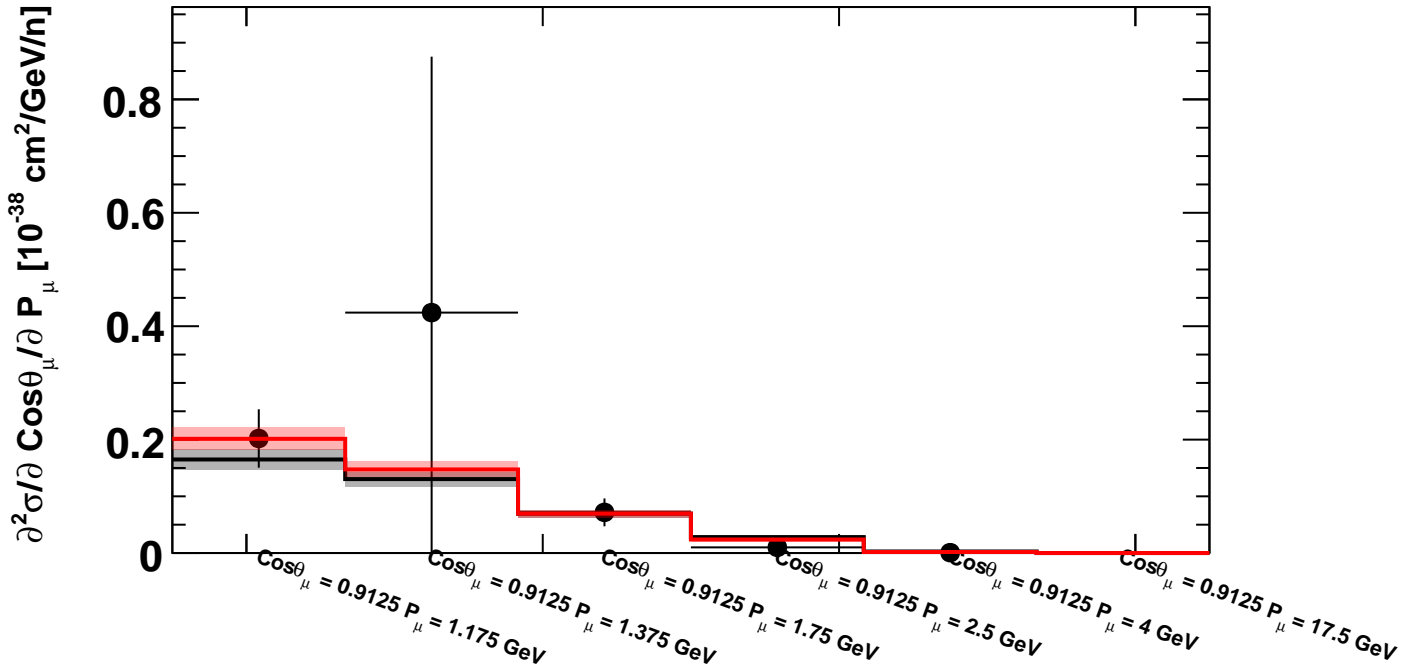
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.34/3$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 1.52/3$ DoF

Bin \in [48; 53]



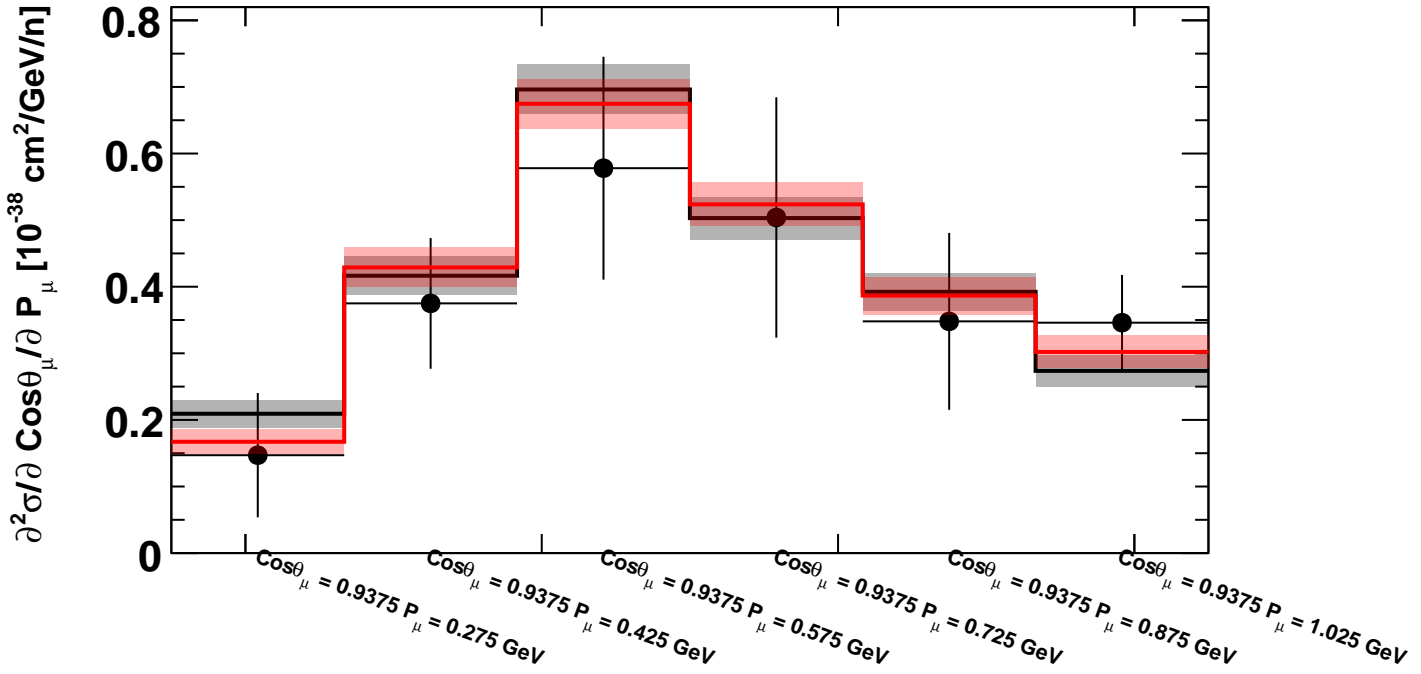
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 5.47/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 6.56/6$ DoF

Bin \in [54; 59]



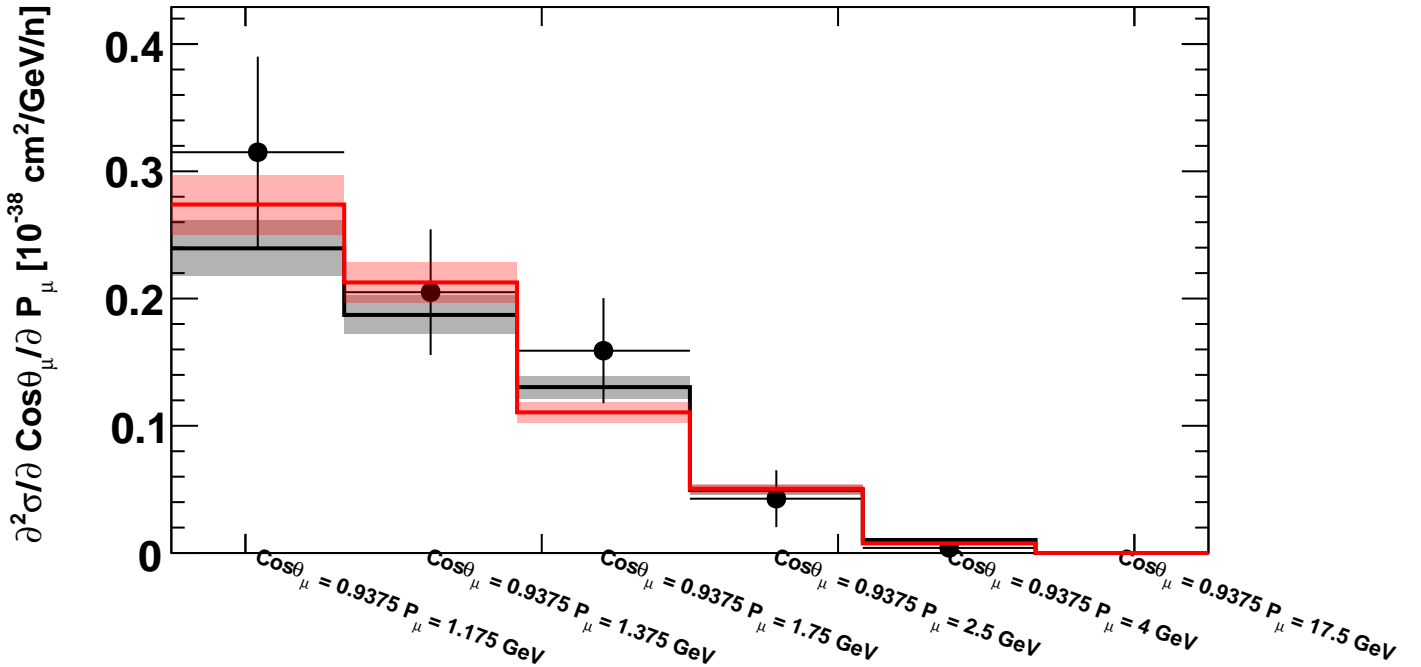
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 7.45/5$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 3.6/5$ DoF

Bin \in [60; 65]



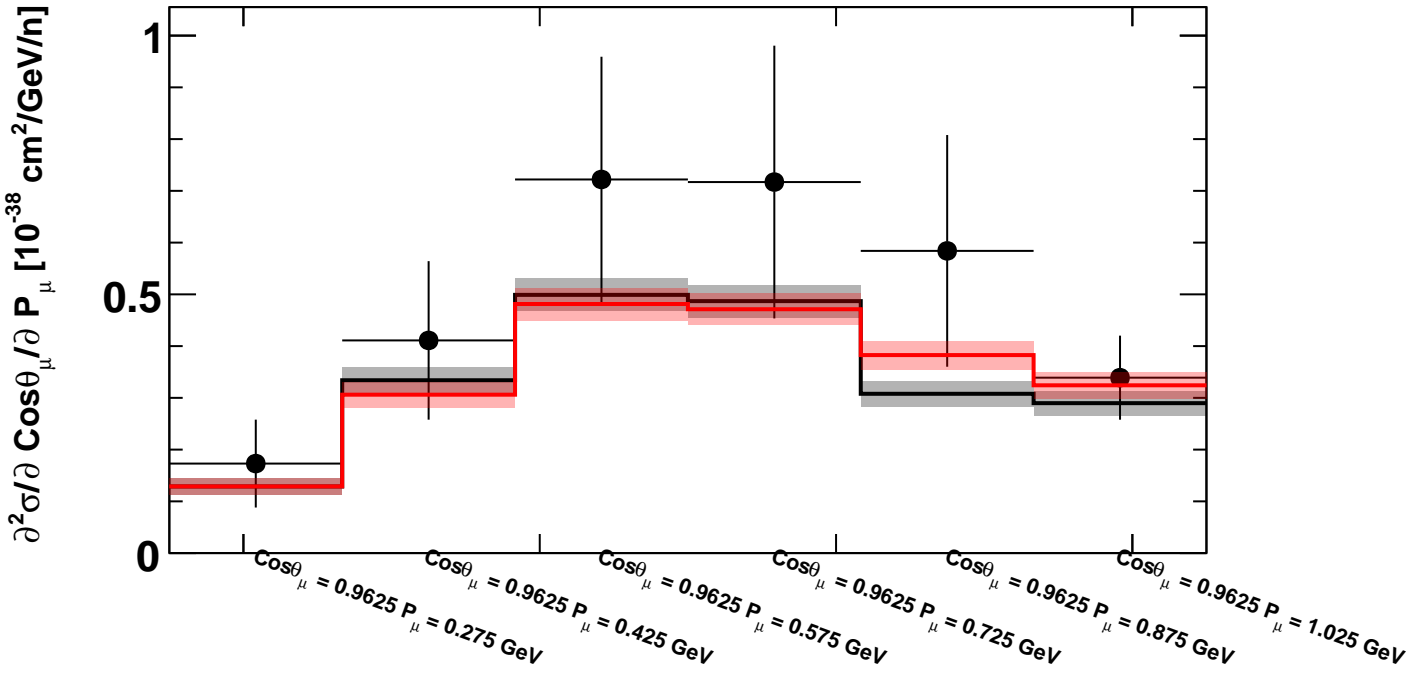
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 6.98/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.73/6$ DoF

Bin \in [66; 71]



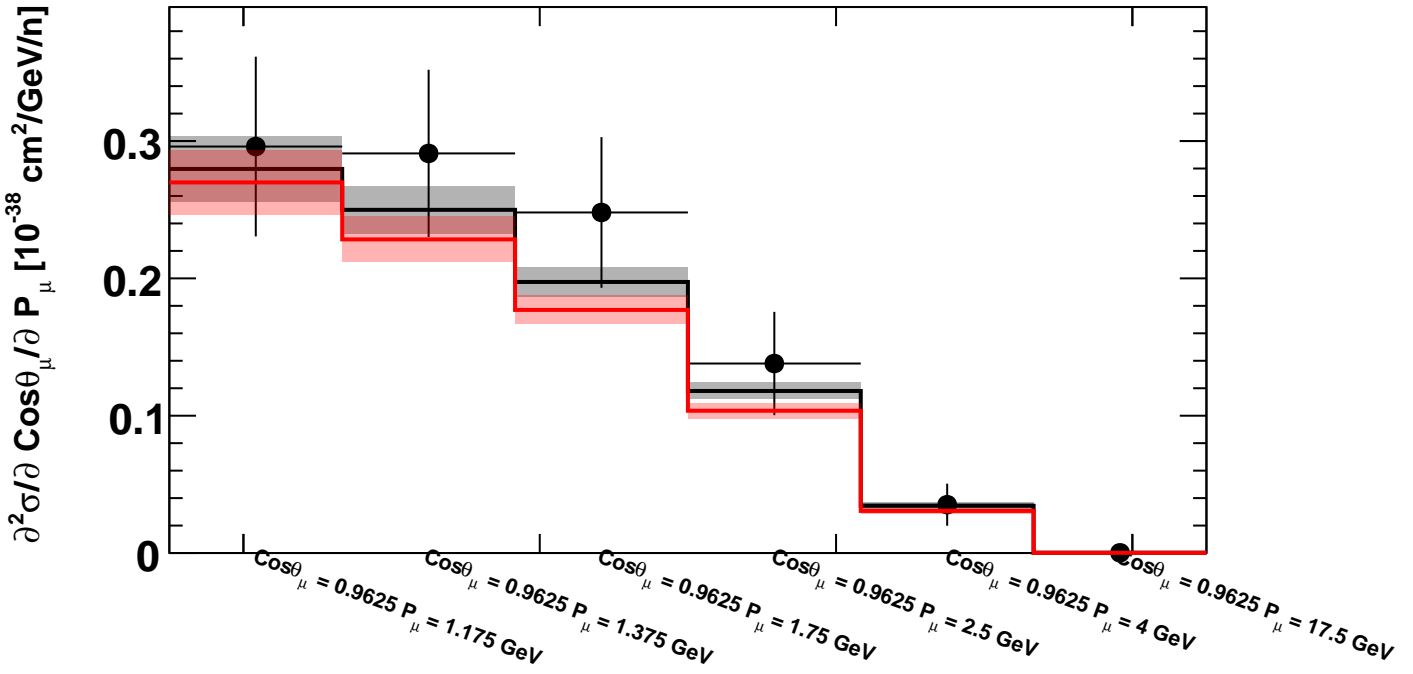
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 5.21/5$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 7.52/5$ DoF

Bin \in [72; 77]



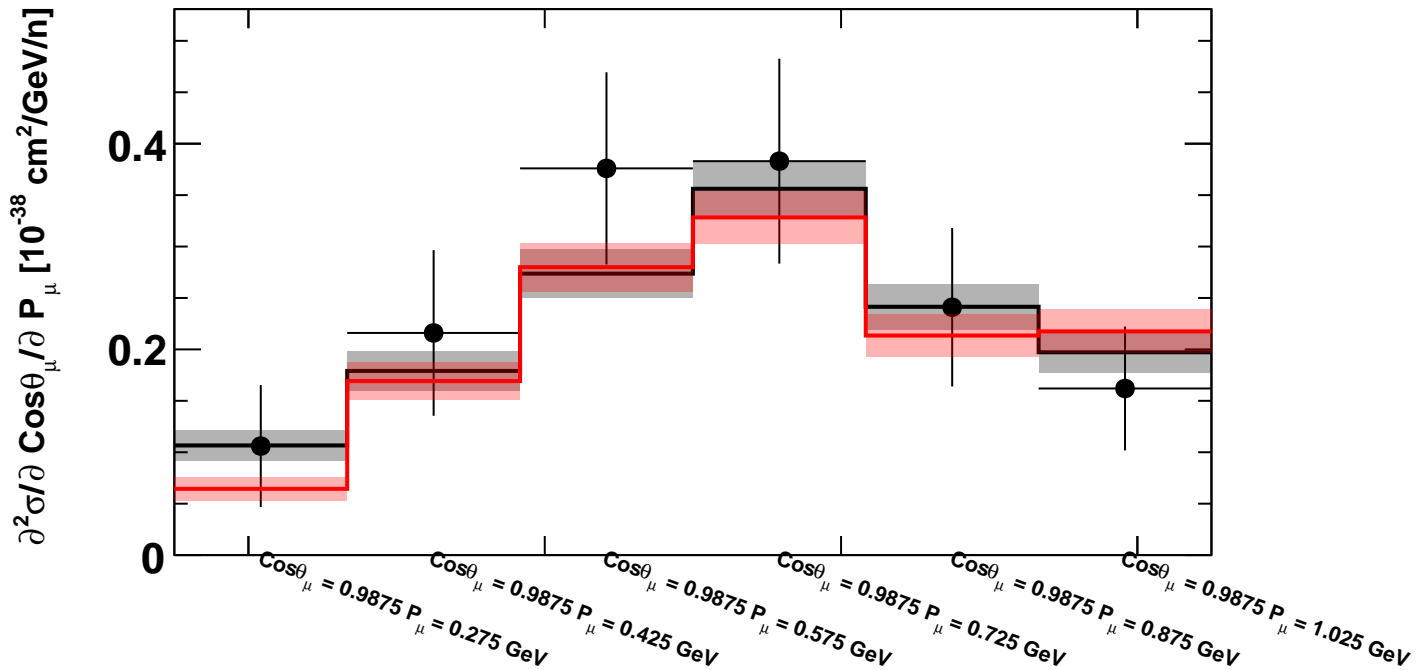
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.98/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 1.17/6$ DoF

Bin \in [78; 83]



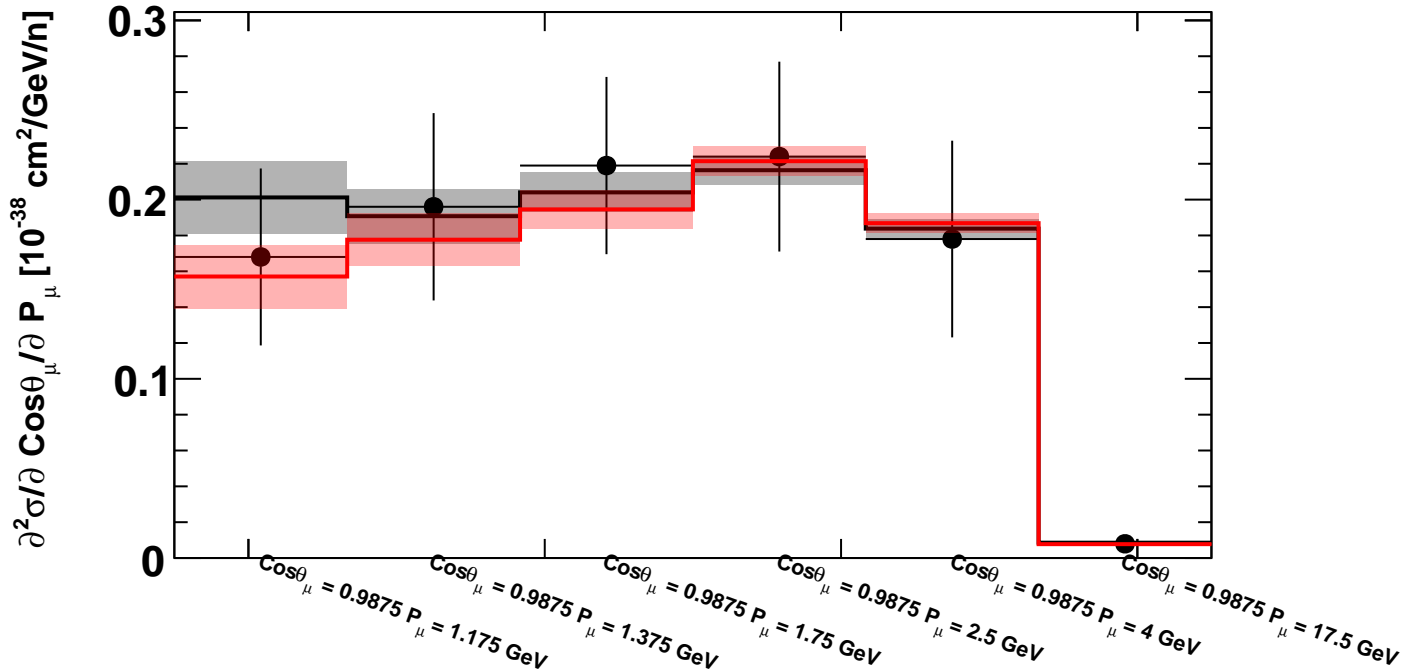
- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.15/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.66/6$ DoF

Bin \in [84; 89]



- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.3/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 3.15/6$ DoF

Bin \in [90; 95]



- t2k_nd280_numucc0pi_2015_rps
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 1.34/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 1.1/6$ DoF

Dataset:

t2k_nd280_numucc0pi_2015

Models:

master/G18_02a_00_000 $\chi^2 = 150 / 67$ DoF

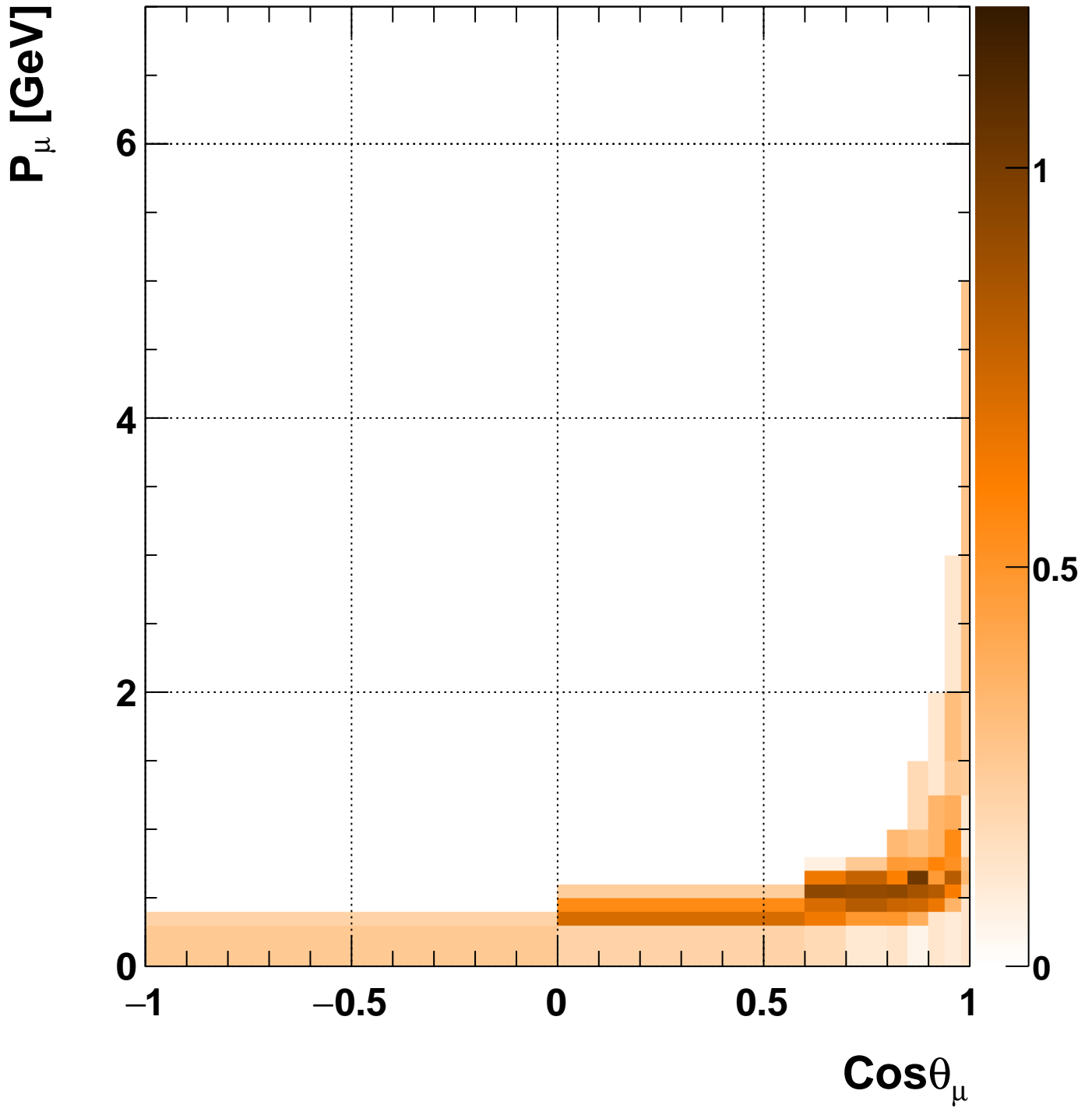
RESFix/G18_02a_00_000 $\chi^2 = 130 / 67$ DoF

Plot:

$$\partial^2 \sigma / \partial \text{Cos} \theta_{\mu} / \partial P_{\mu}$$

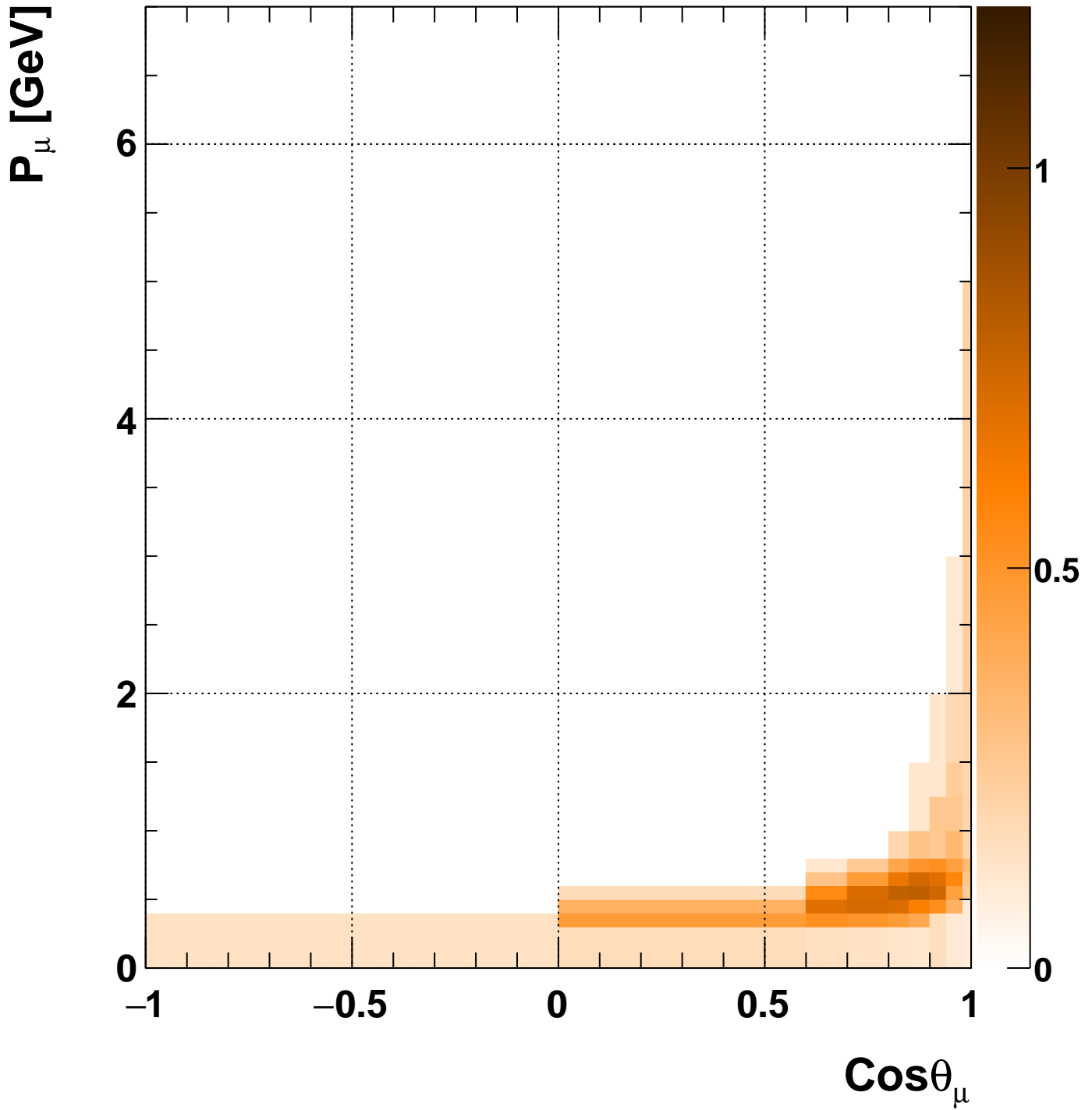
67 DoF, $\chi^2 = 150$ **130**

2019/11/05 13:39:11



$\partial^2 \sigma / \partial \text{Cos}\theta_\mu \partial P_\mu$ [10^{-38} cm²/GeV/n]

Data: t2k_nd280_numucc0pi_2015



$$\frac{d^2\sigma}{d\text{Cos}\theta_\mu dP_\mu} [10^{-38} \text{ cm}^2/\text{GeV/n}]$$

Pred: master:G18_02a_00_000:t2k_nd280_numu_fhc

t2k_nd280_numucc0pi_2015

VS

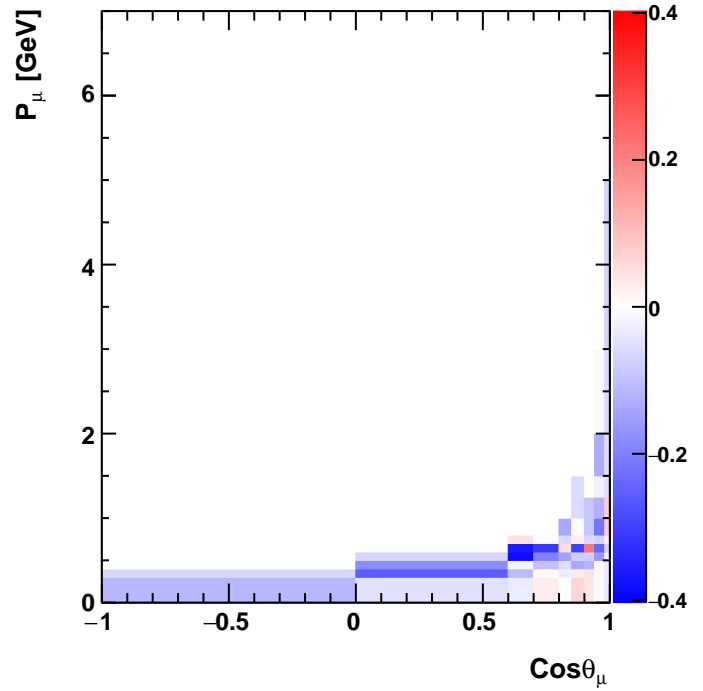
master:G18_02a_00_000:t2k_nd280_numu_fhc

$$\partial^2 \sigma / \partial \text{Cos}\theta_\mu \partial P_\mu$$

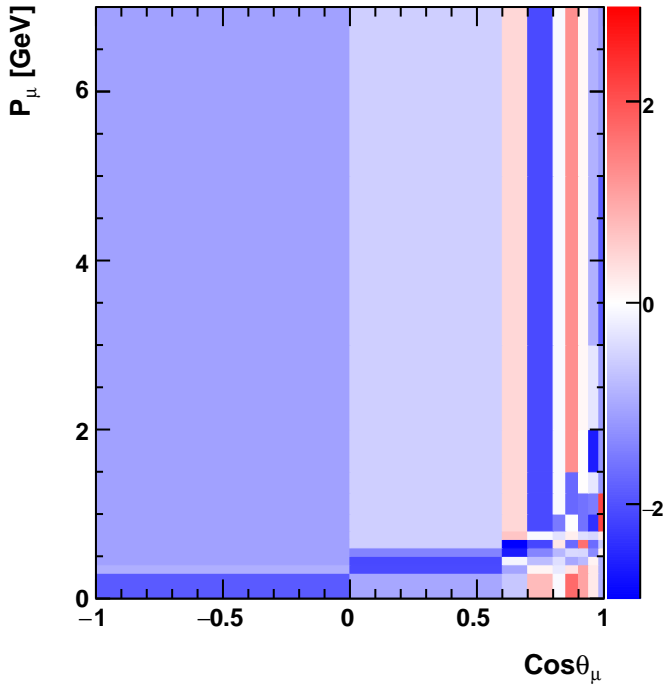
[$10^{-38} \text{ cm}^2/\text{GeV/n}$]

$\chi^2 = 149.663/67 \text{ DoF}$

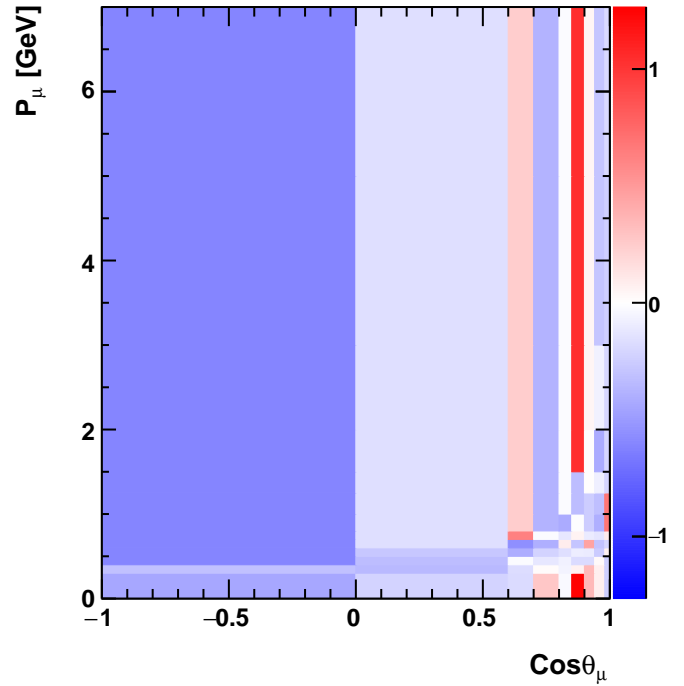
pred - data

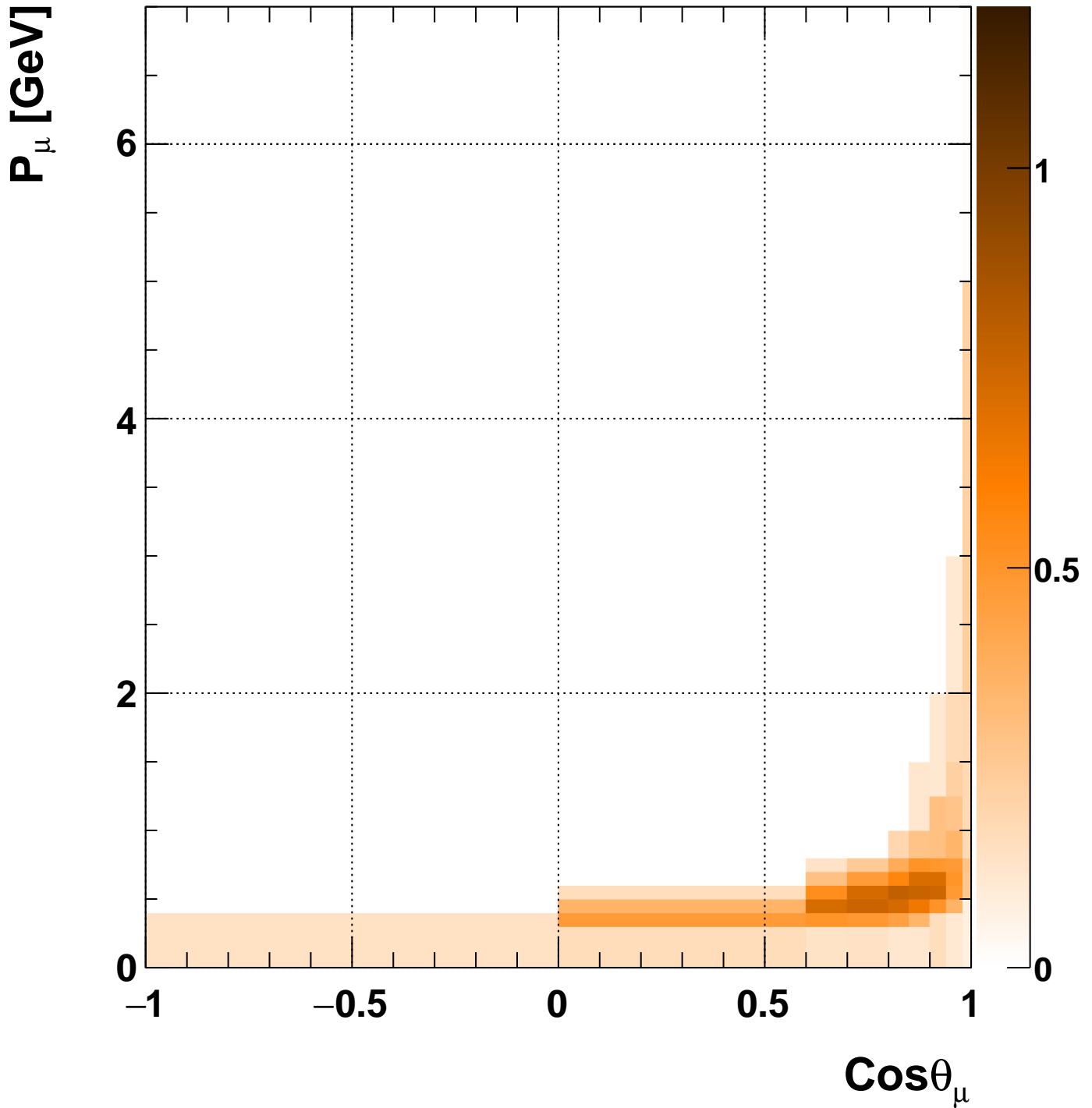


(pred - data)/ σ



(pred - data) / data





$$\frac{d^2\sigma}{d \text{Cos}\theta_\mu d P_\mu} [10^{-38} \text{ cm}^2/\text{GeV/n}]$$

Pred: RESFix:G18_02a_00_000:t2k_nd280_numu_fhc

t2k_nd280_numucc0pi_2015

VS

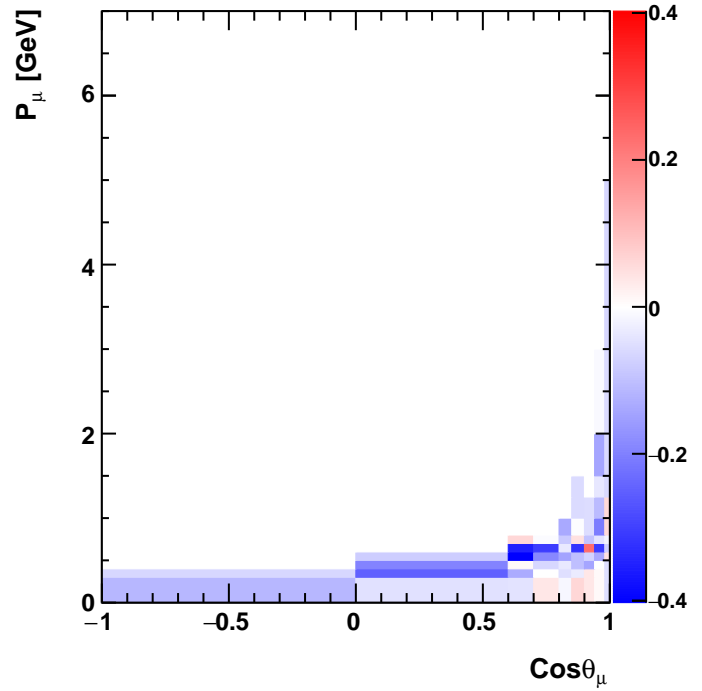
RESFix:G18_02a_00_000:t2k_nd280_numu_fhc

$$\frac{\partial^2 \sigma}{\partial \text{Cos}\theta_\mu \partial P_\mu}$$

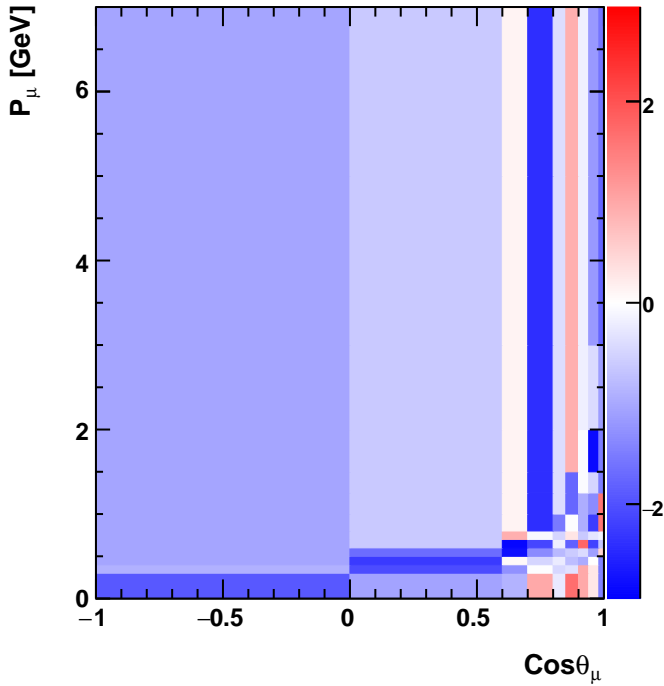
[$10^{-38} \text{ cm}^2/\text{GeV/n}$]

$\chi^2 = 129.856/67 \text{ DoF}$

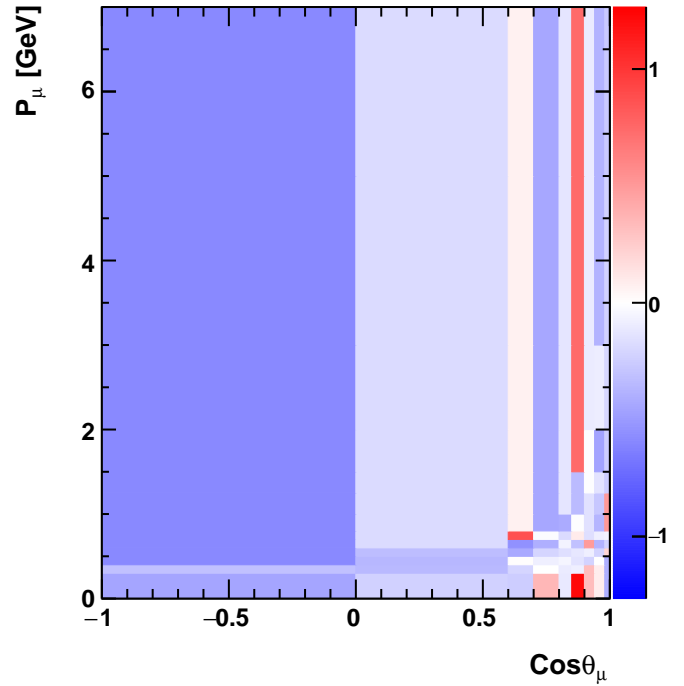
pred - data

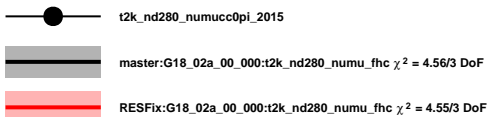
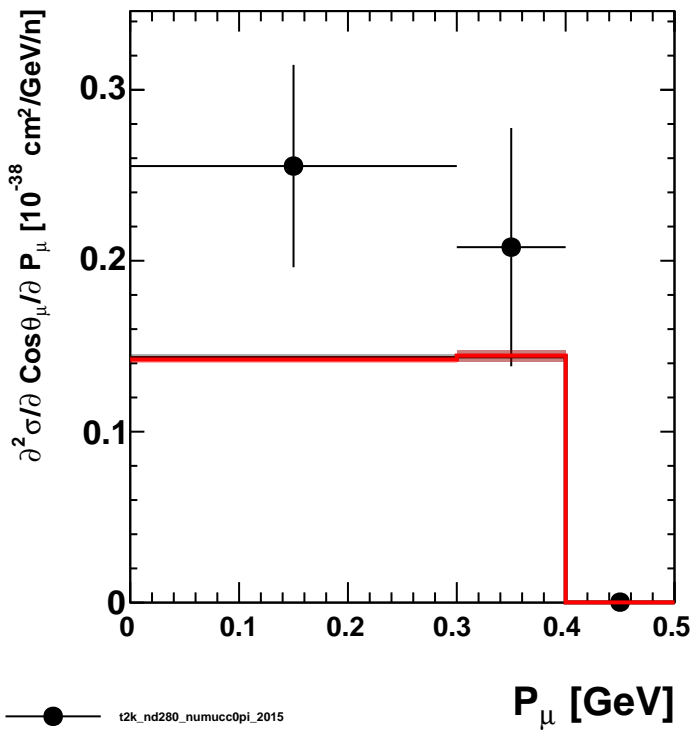
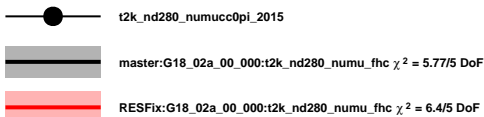
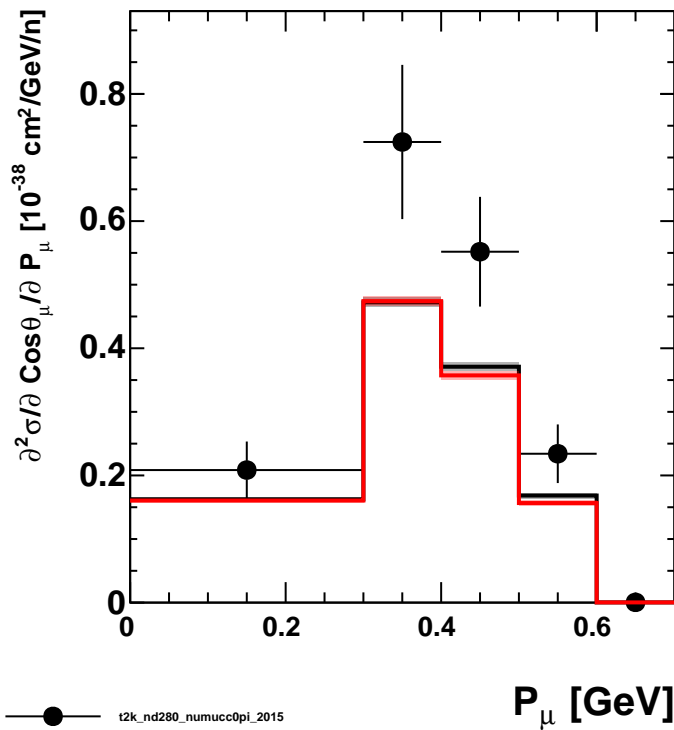
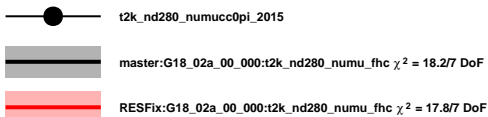
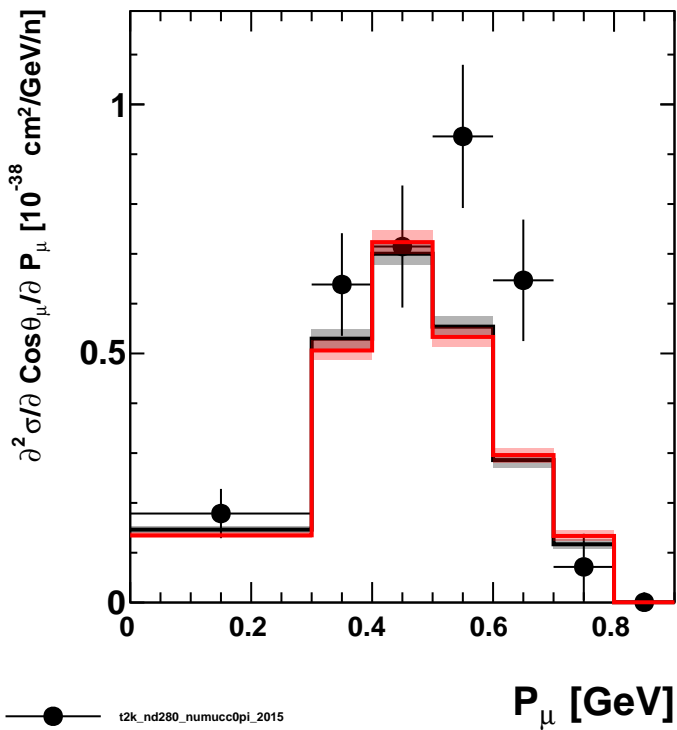
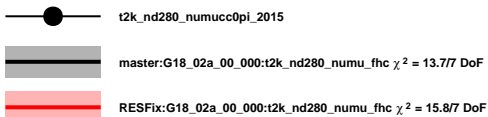
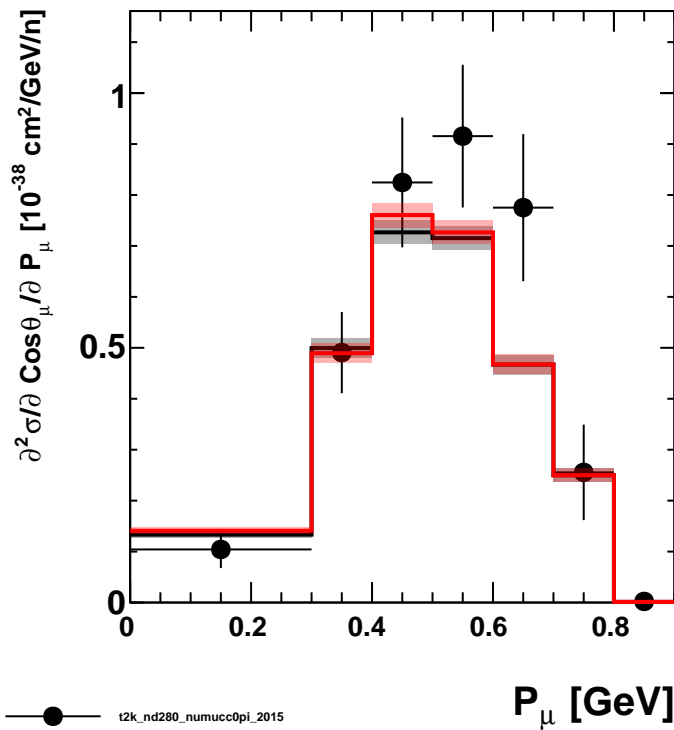


(pred - data)/ σ

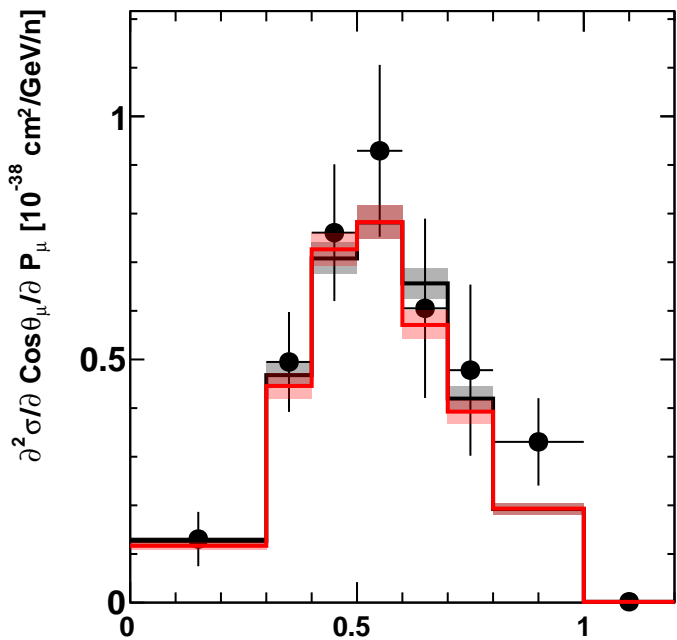


(pred - data) / data

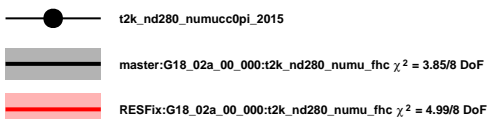


$\text{Cos}\theta_\mu \in [-1; 0]$  $\text{Cos}\theta_\mu \in [0; 0.6]$  $\text{Cos}\theta_\mu \in [0.6; 0.7]$  $\text{Cos}\theta_\mu \in [0.7; 0.8]$ 

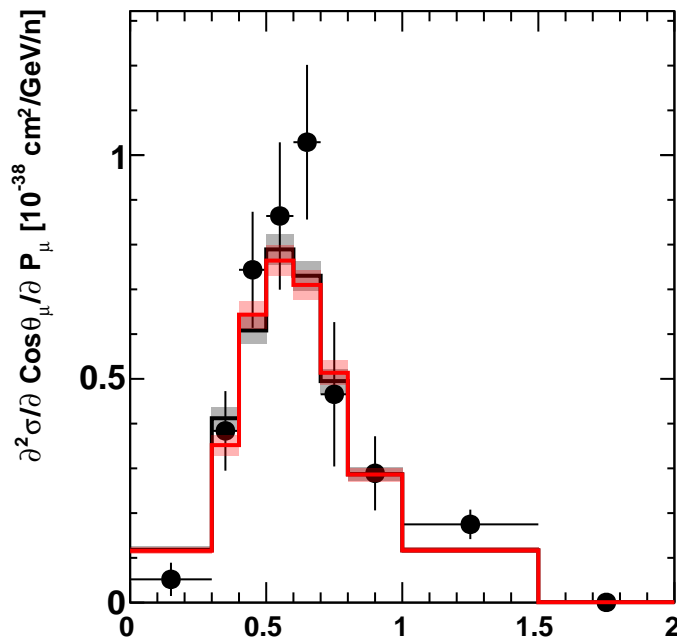
$\text{Cos}\theta_\mu \in [0.8; 0.85]$



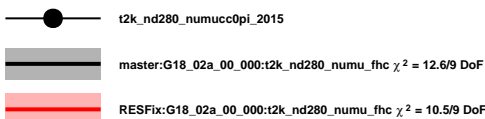
P_μ [GeV]



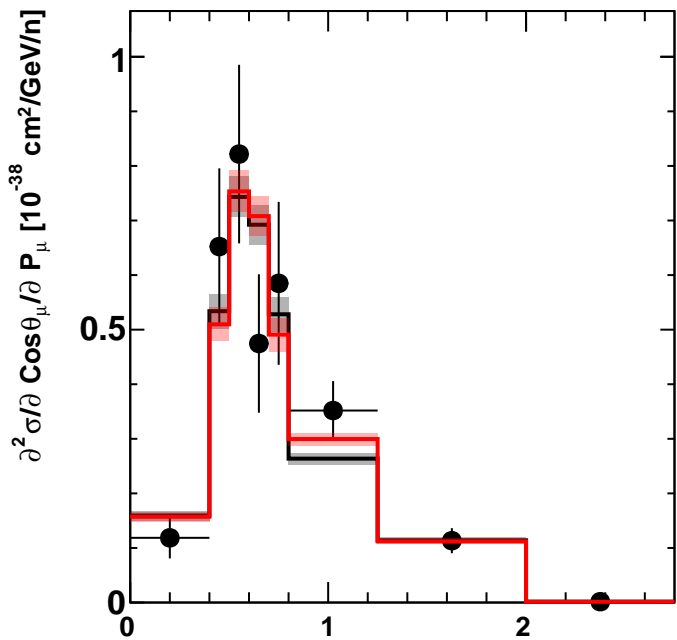
$\text{Cos}\theta_\mu \in [0.85; 0.9]$



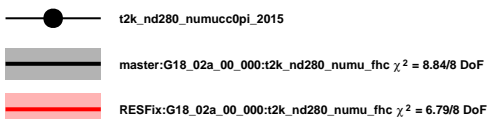
P_μ [GeV]



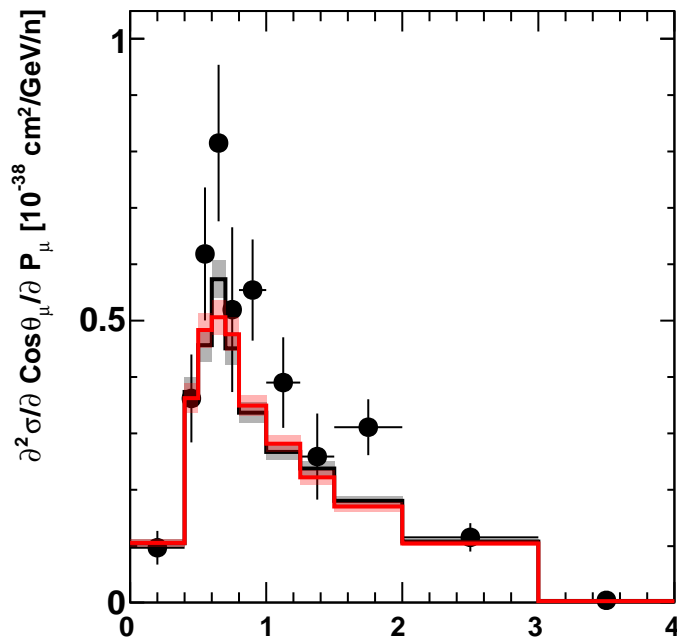
$\text{Cos}\theta_\mu \in [0.9; 0.94]$



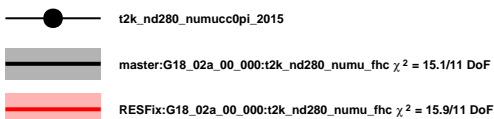
P_μ [GeV]



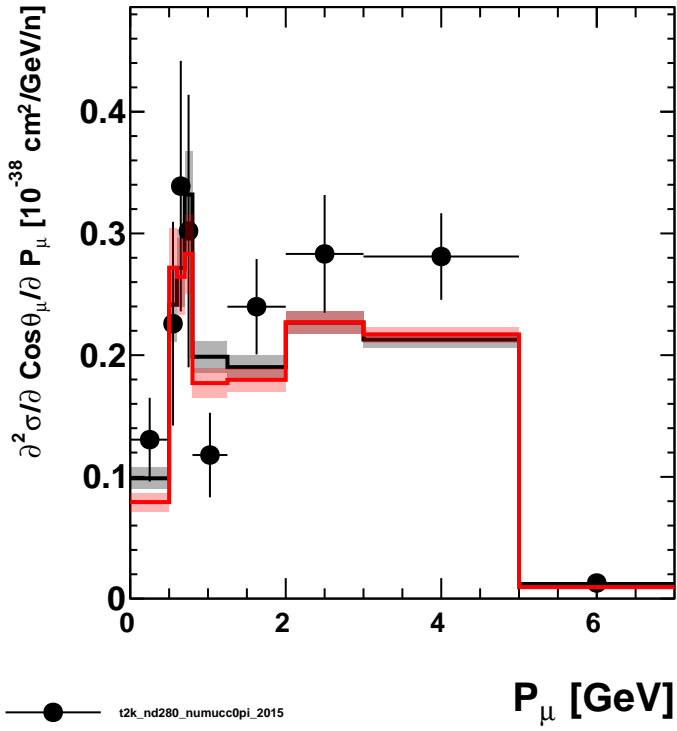
$\text{Cos}\theta_\mu \in [0.94; 0.98]$



P_μ [GeV]

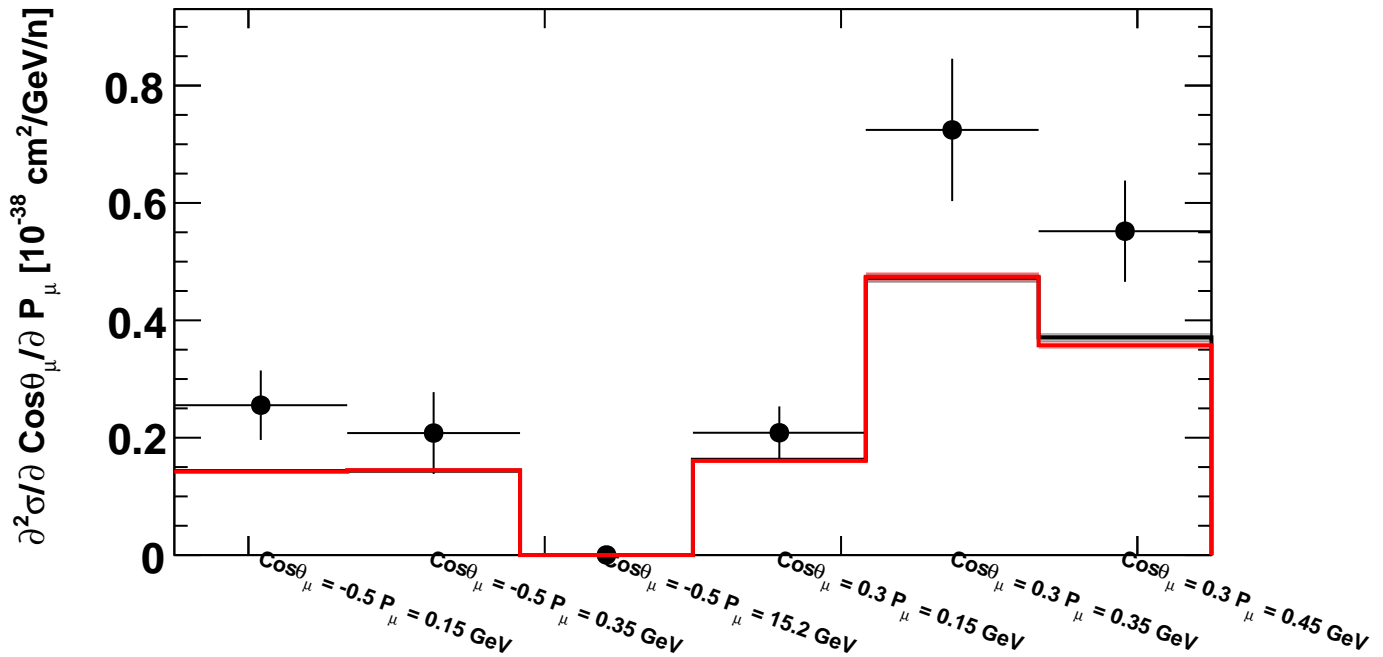


$\text{Cos}\theta_{\mu} \in [0.98; 1]$



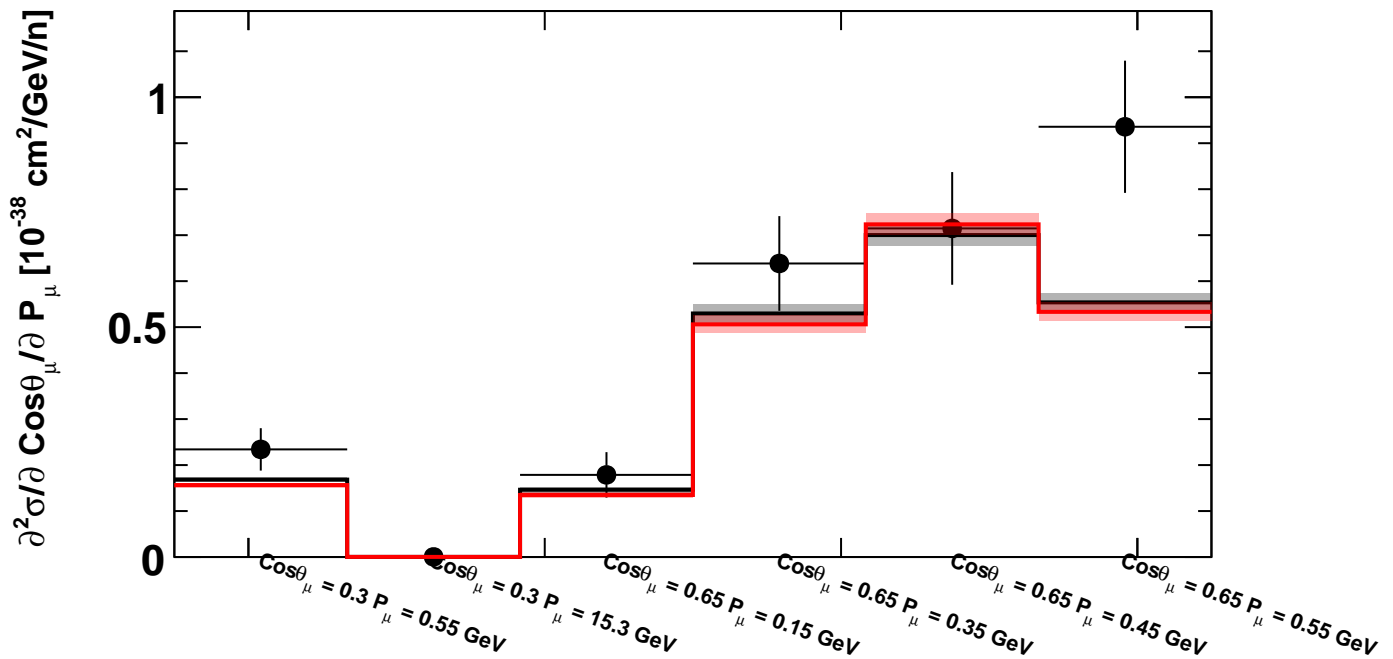
- t2k_nd280_numucc0pi_2015
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 15.2/9$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 12.6/9$ DoF

Bin $\in [0; 5]$



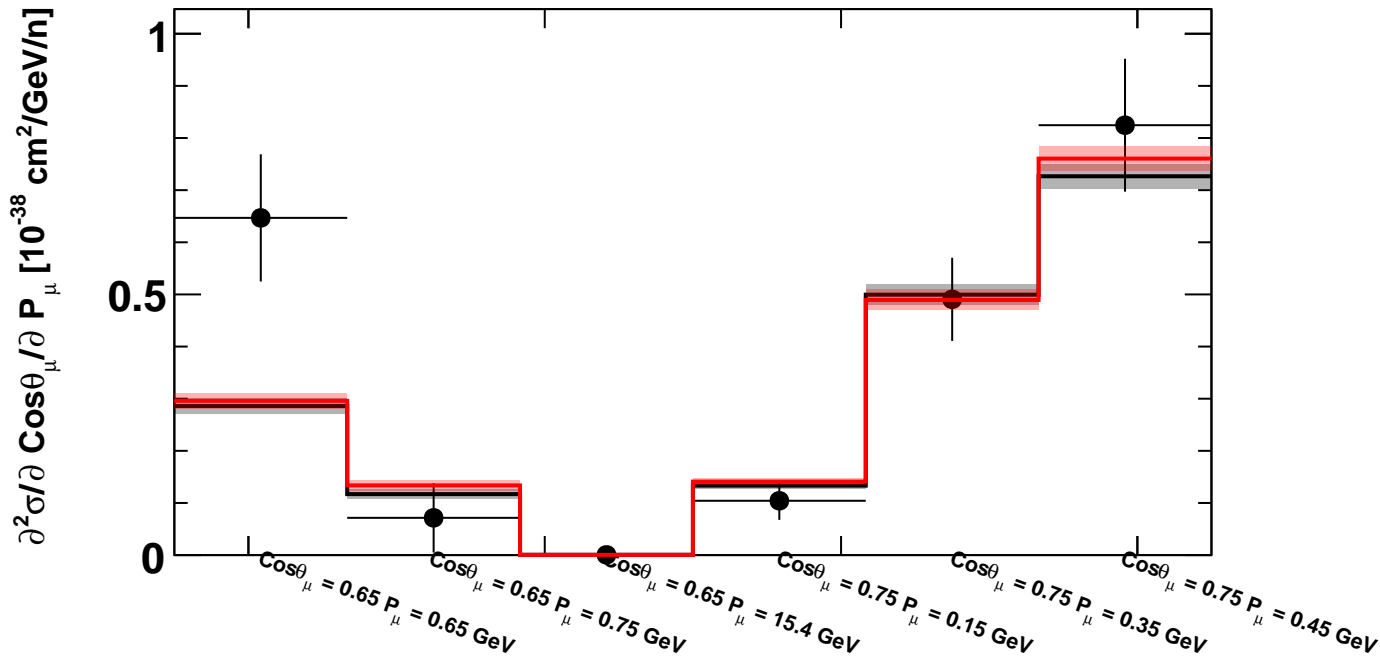
- t2k_nd280_numucc0pi_2015
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 6.25/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 6.42/6$ DoF

Bin $\in [6; 11]$



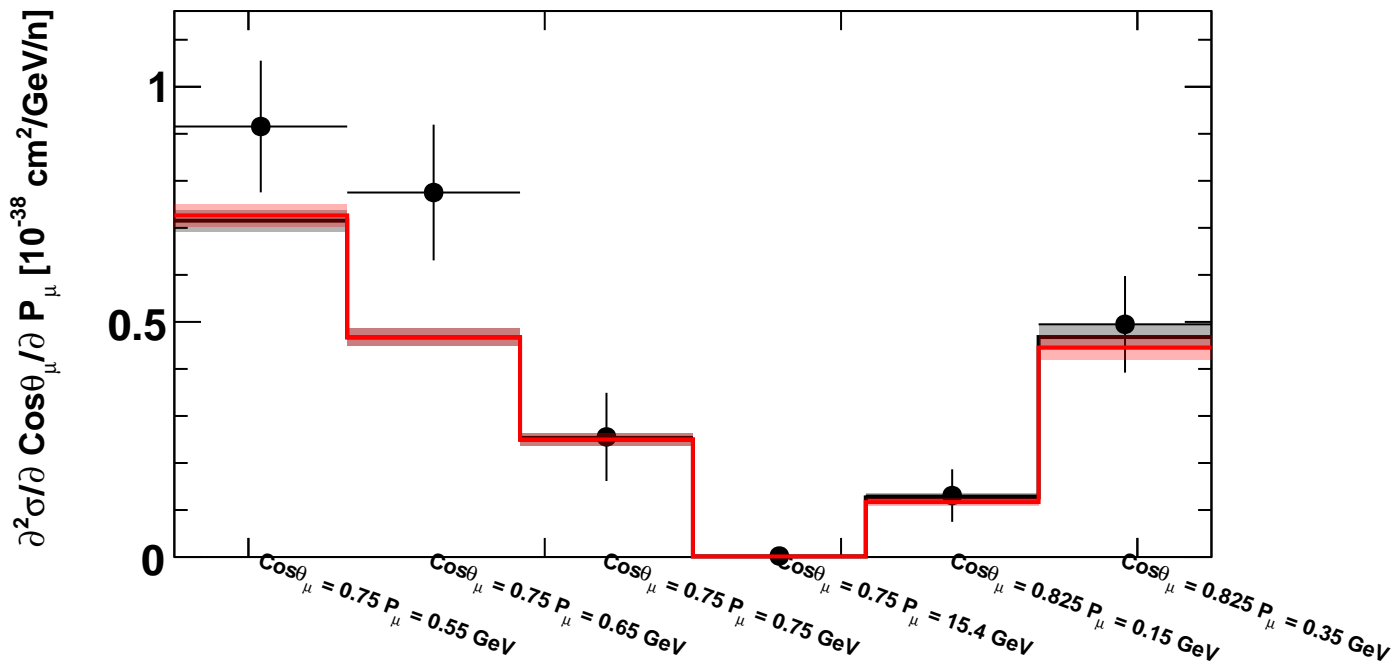
- t2k_nd280_numucc0pi_2015
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 7.41/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 8.86/6$ DoF

Bin \in [12; 17]



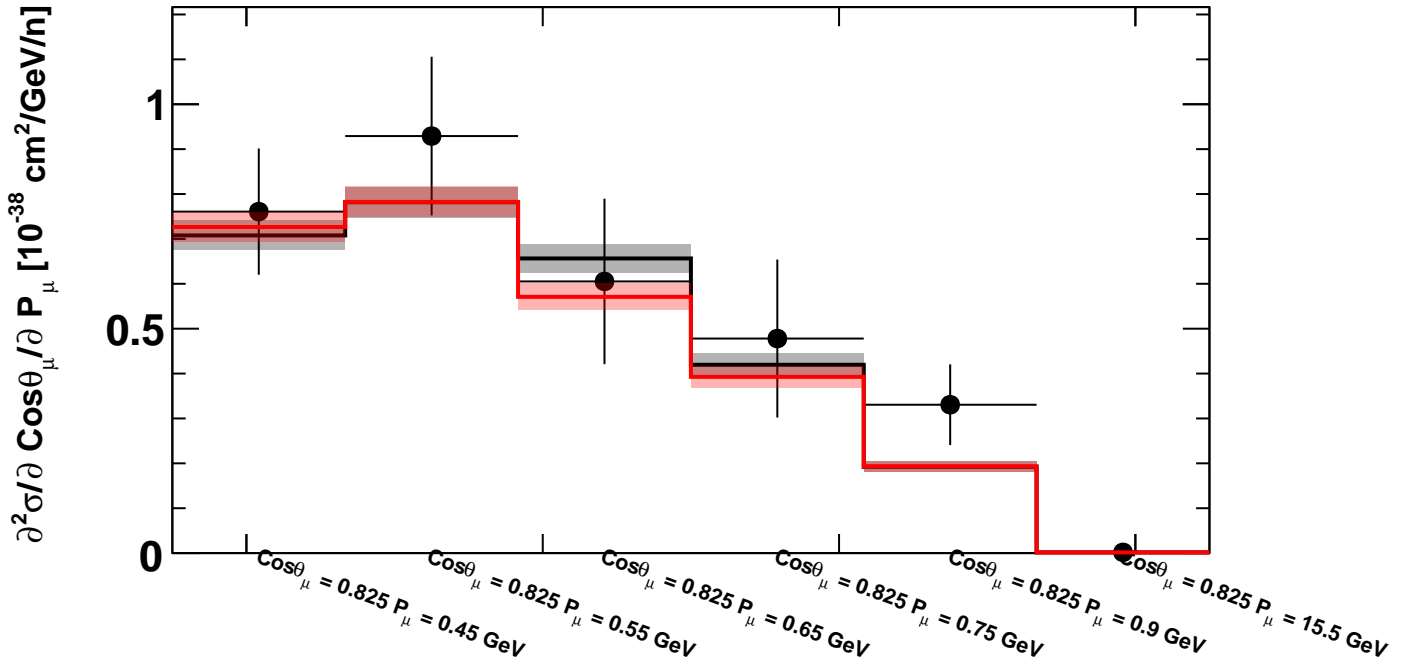
- t2k_nd280_numucc0pi_2015
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 13.5/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 12.6/6$ DoF

Bin \in [18; 23]



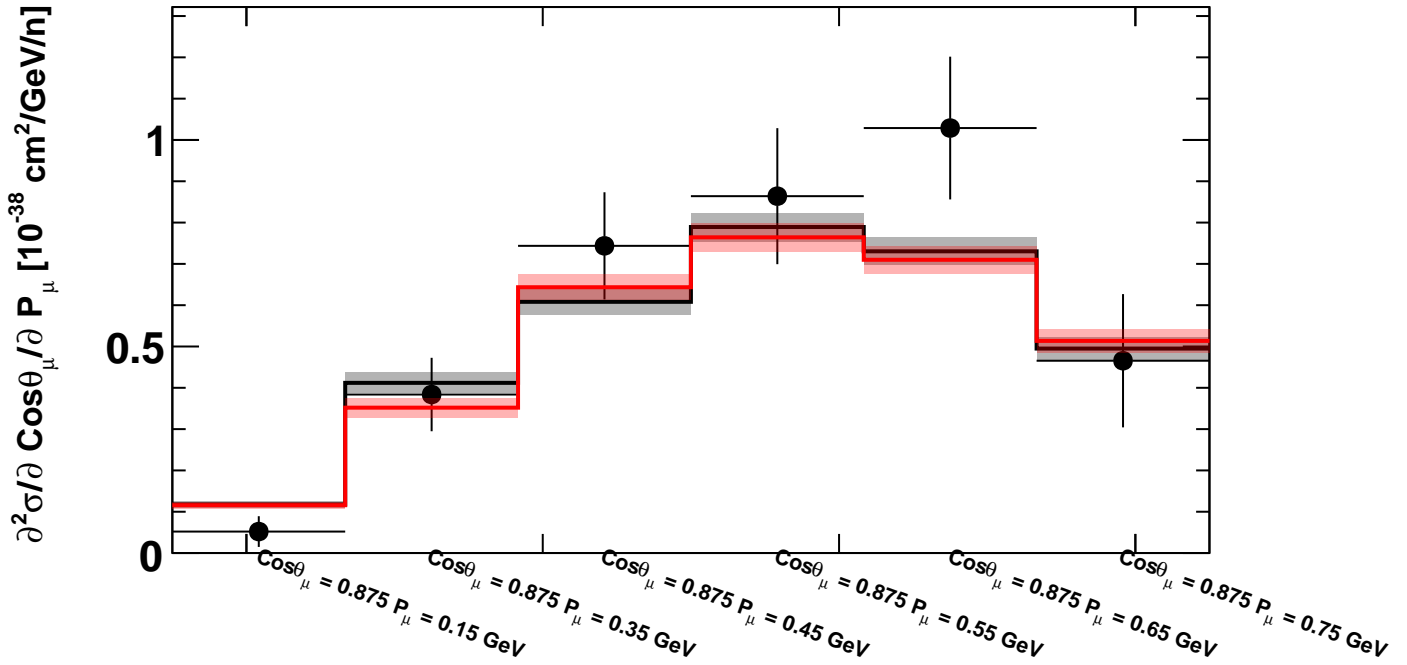
- t2k_nd280_numucc0pi_2015
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 9.08/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 9.3/6$ DoF

Bin \in [24; 29]



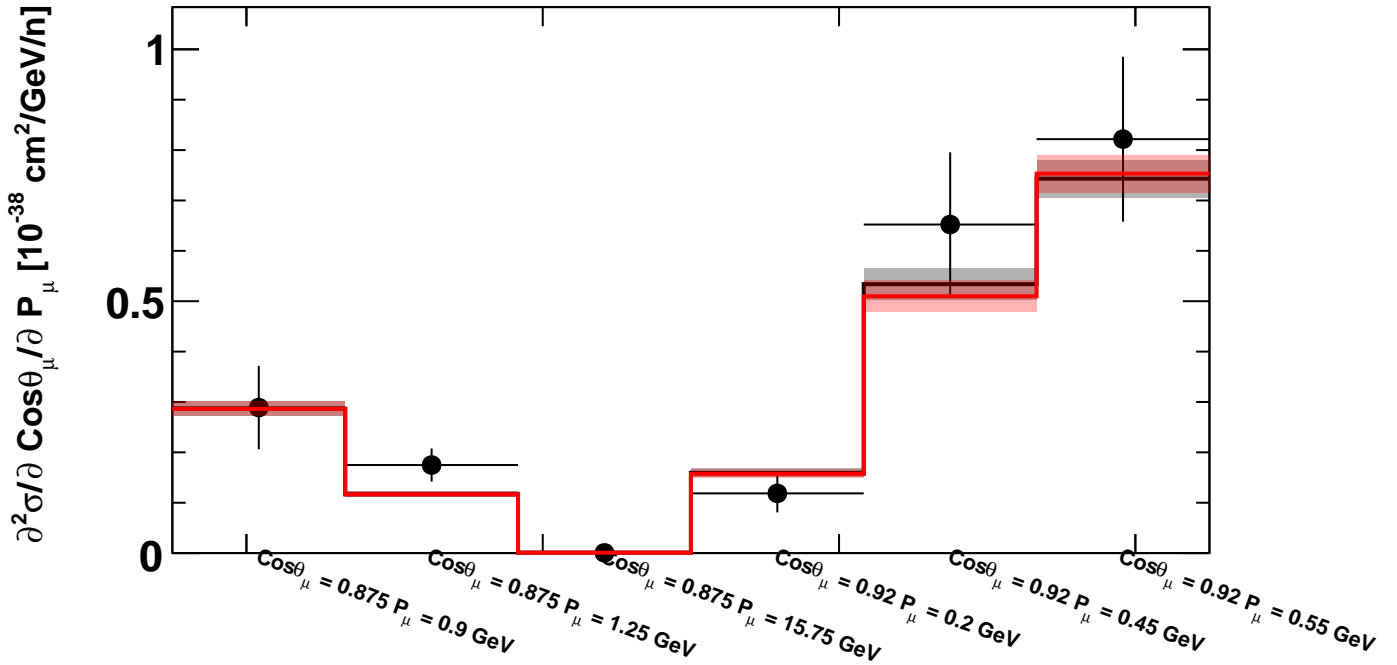
- t2k_nd280_numucc0pi_2015
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 3.68/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 4.81/6$ DoF

Bin \in [30; 35]



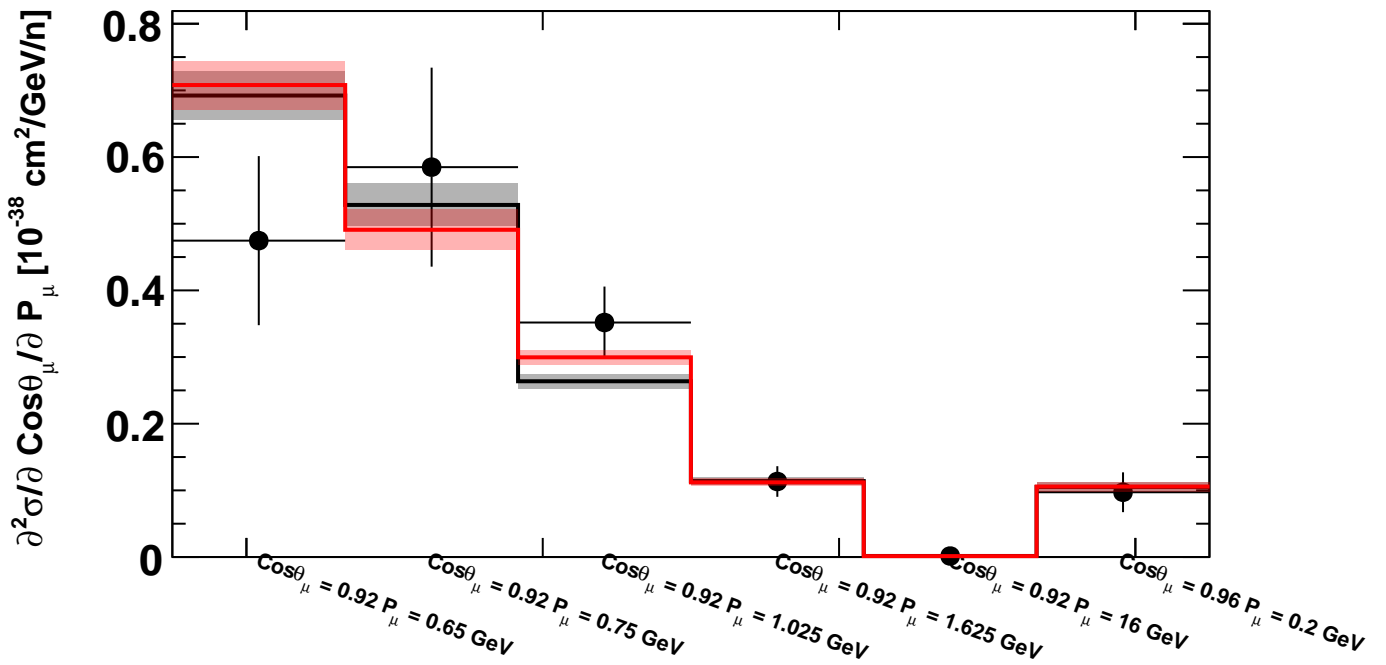
- t2k_nd280_numucc0pi_2015
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 8.32/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 7.57/6$ DoF

Bin \in [36; 41]

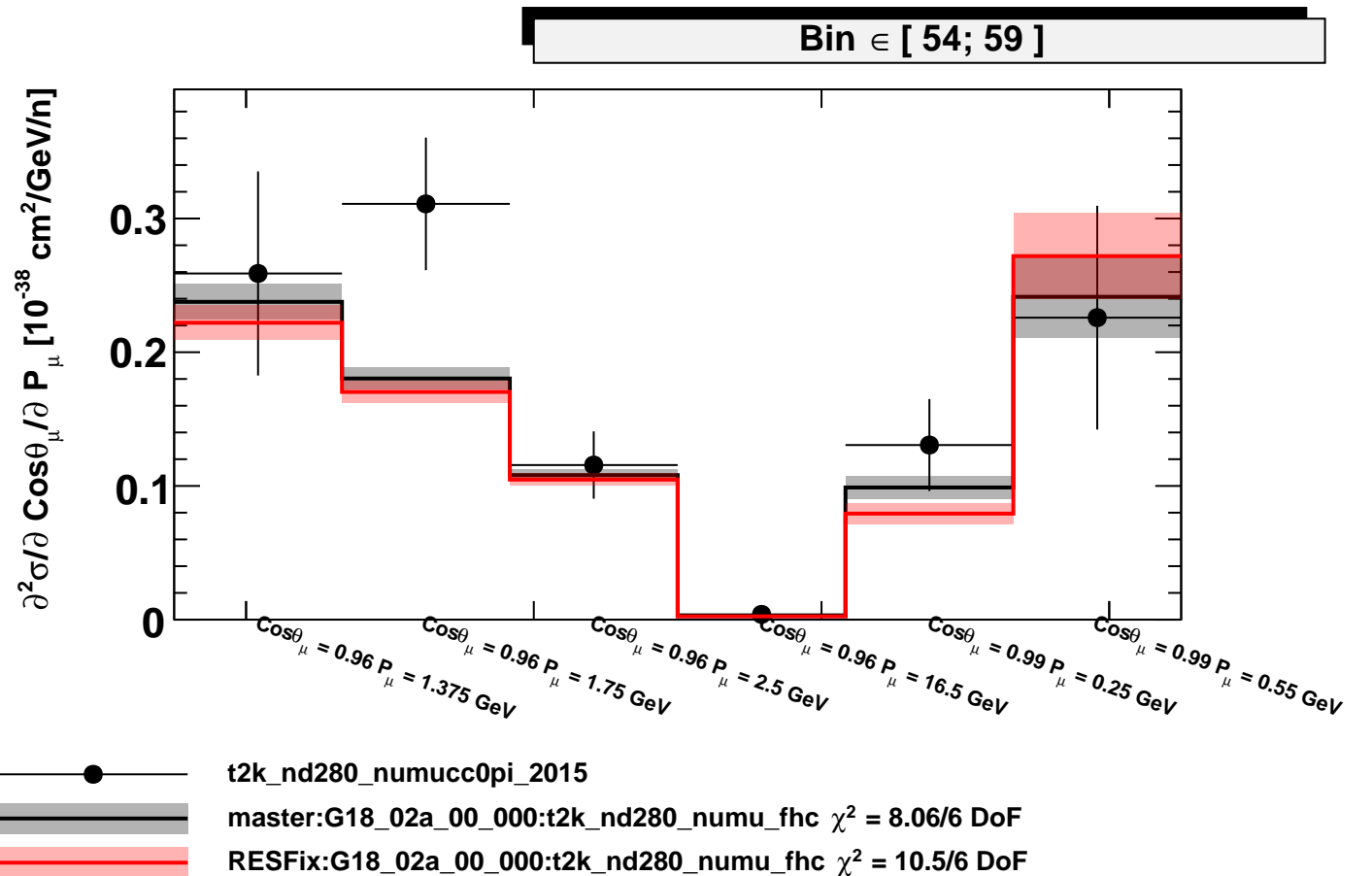
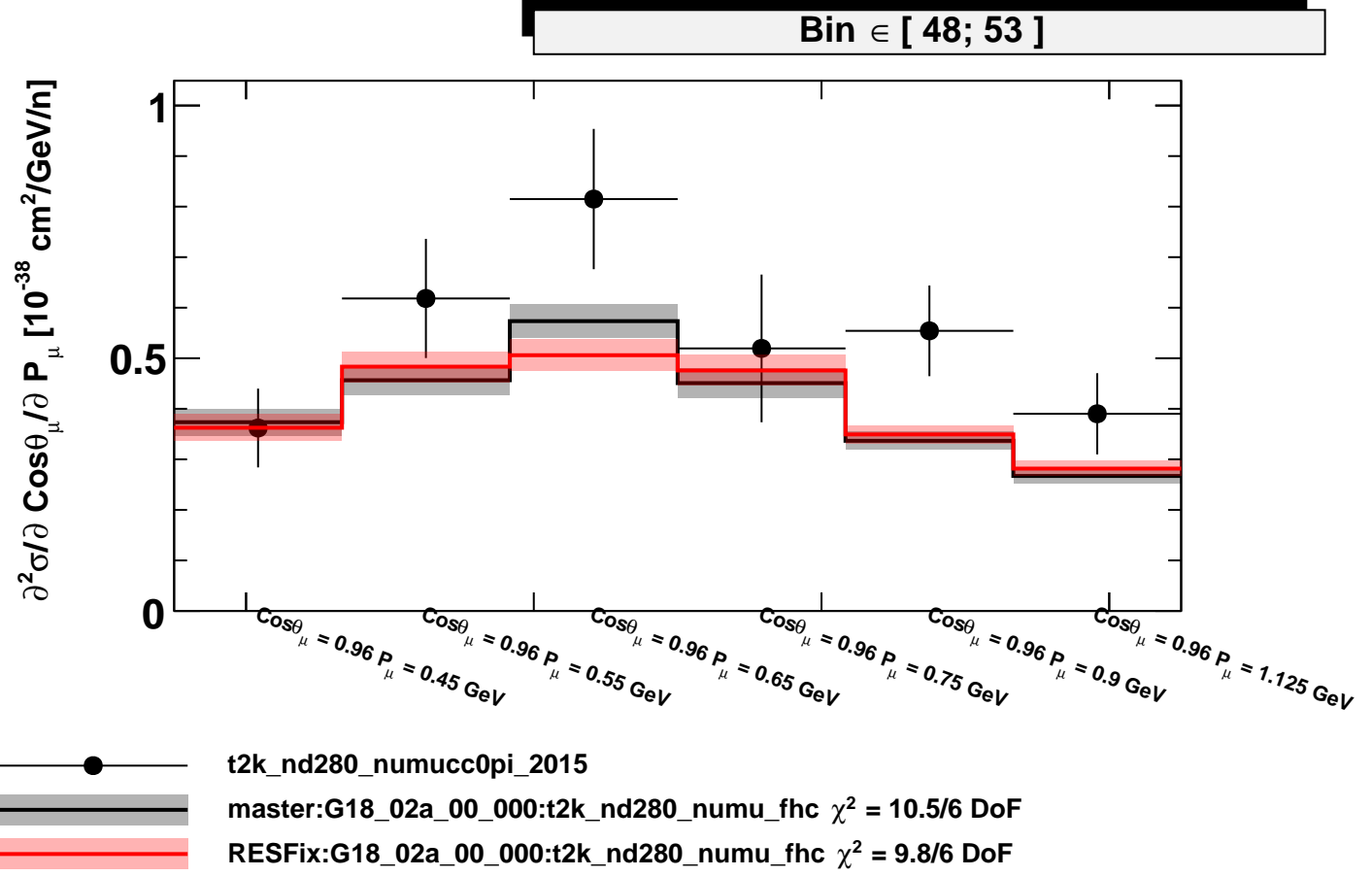


- t2k_nd280_numucc0pi_2015
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 6.1/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 5.3/6$ DoF

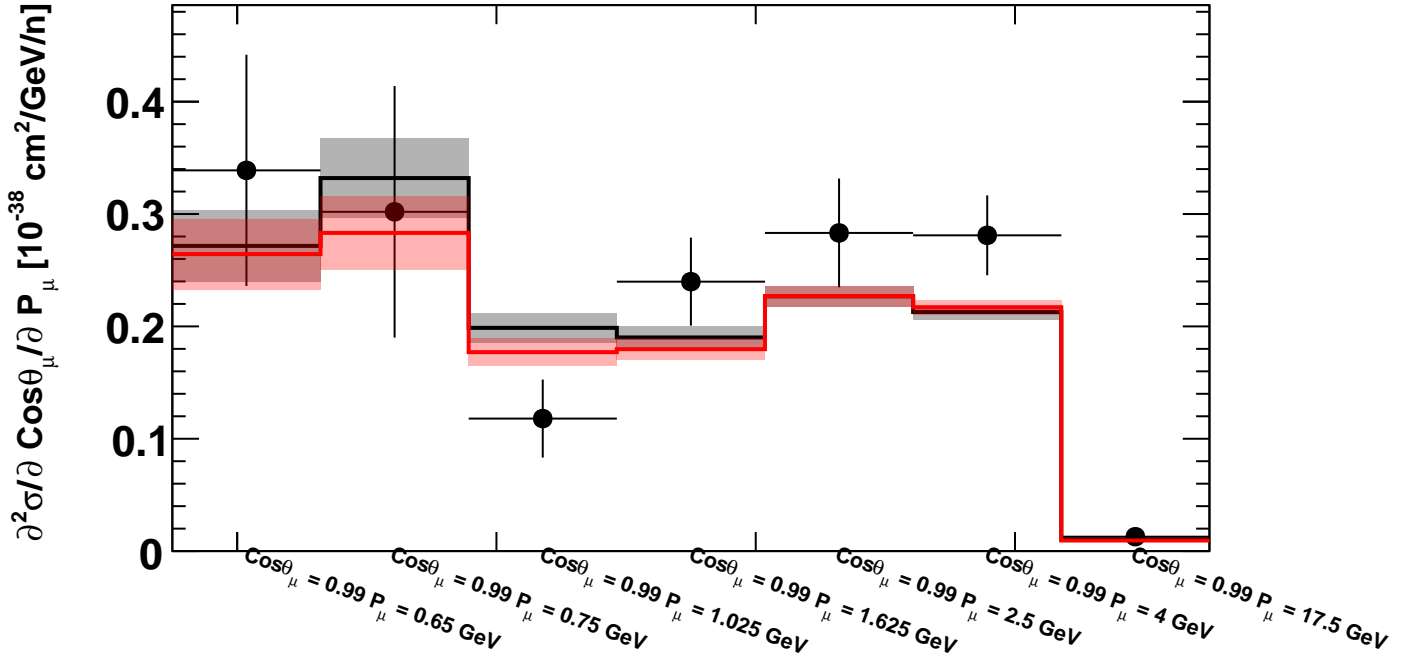
Bin \in [42; 47]



- t2k_nd280_numucc0pi_2015
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 7.1/6$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 5.29/6$ DoF



Bin \in [60; 66]



- t2k_nd280_numucc0pi_2015
- master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 14.8/7$ DoF
- RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 10.9/7$ DoF

Dataset:

t2k_nd280_numucc_2013

Models:

master/G18_02a_00_000 $\chi^2 = 25.1 / 20$ DoF

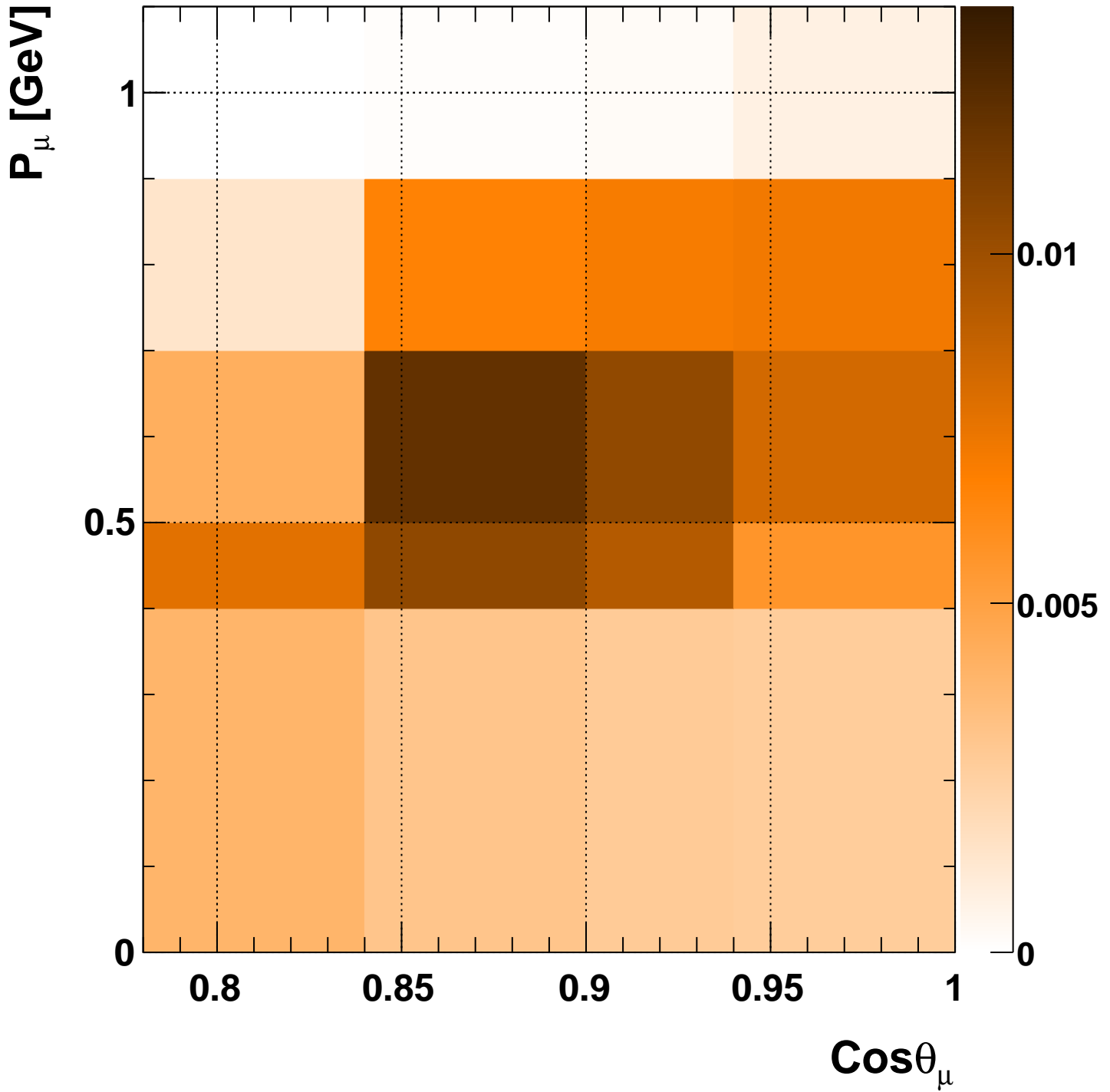
RESFix/G18_02a_00_000 $\chi^2 = 30.2 / 20$ DoF

Plot:

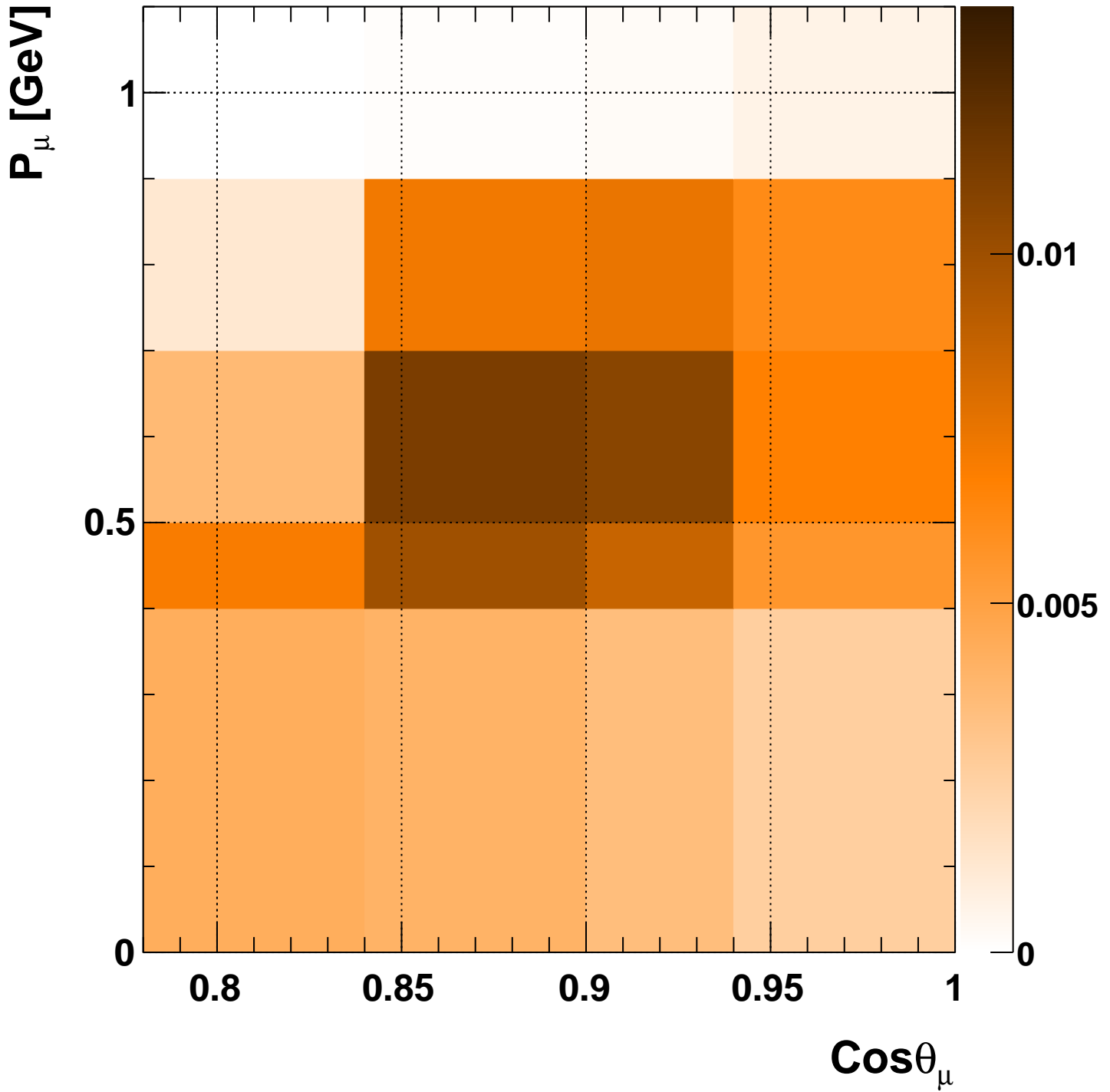
$$\partial^2 \sigma / \partial \text{Cos} \theta_{\mu} \partial P_{\mu}$$

20 DoF, $\chi^2 = 25.1$ **30.2**

2019/11/05 13:39:12



$\frac{\partial^2 \sigma}{\partial \text{Cos}\theta_\mu \partial P_\mu} [10^{-38} \text{ cm}^2/\text{GeV}]$
Data: t2k_nd280_numucc_2013



$$\frac{\partial^2 \sigma}{\partial \text{Cos}\theta_\mu \partial P_\mu} [10^{-38} \text{ cm}^2/\text{GeV}]$$

Pred: master:G18_02a_00_000:t2k_nd280_numu_fhc

t2k_nd280_numucc_2013

VS

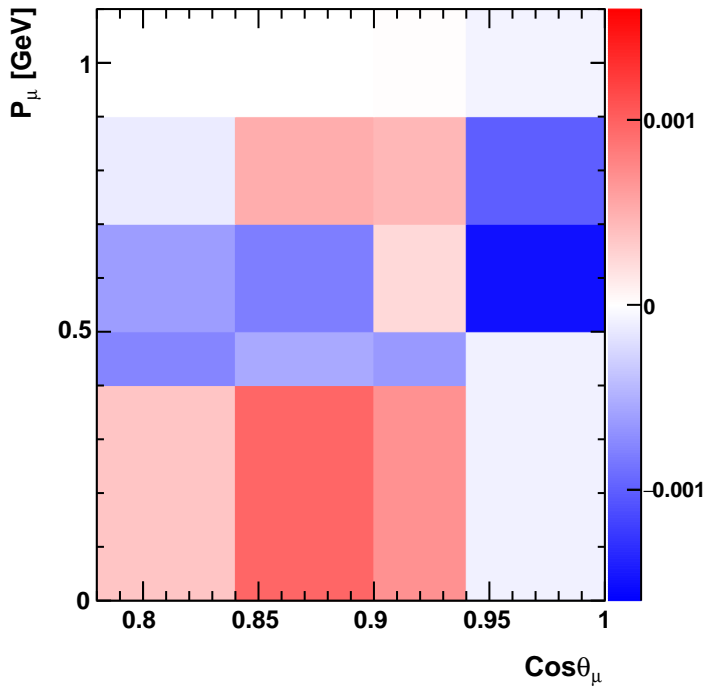
master:G18_02a_00_000:t2k_nd280_numu_fhc

$\partial^2 \sigma / \partial \text{Cos}\theta_\mu \partial P_\mu$

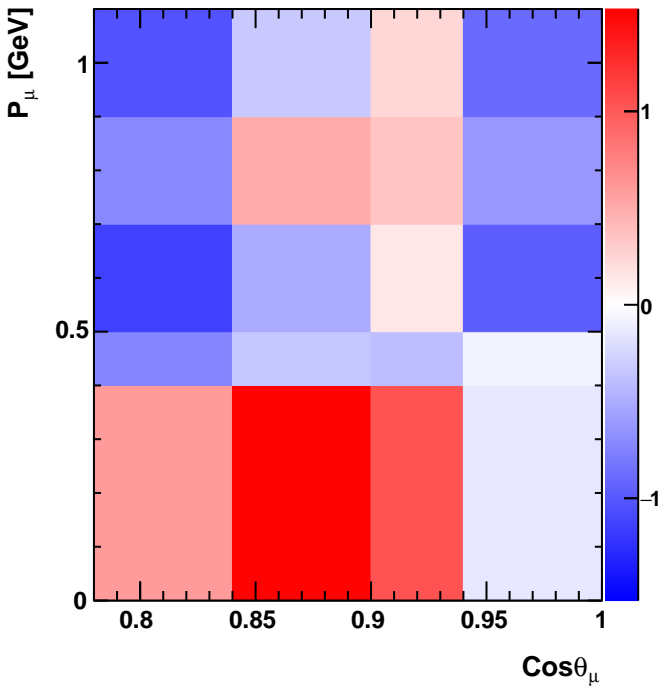
[10⁻³⁸ cm²/GeV]

$\chi^2 = 25.0889/20$ DoF

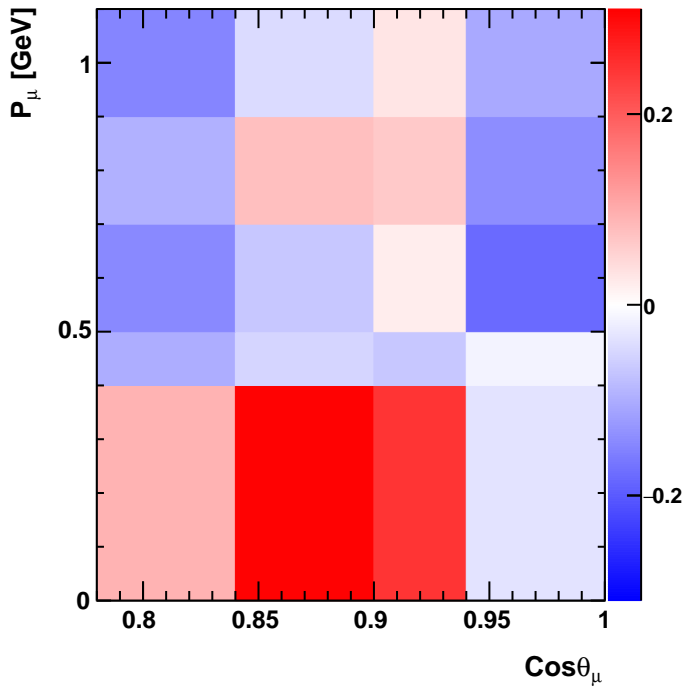
pred - data

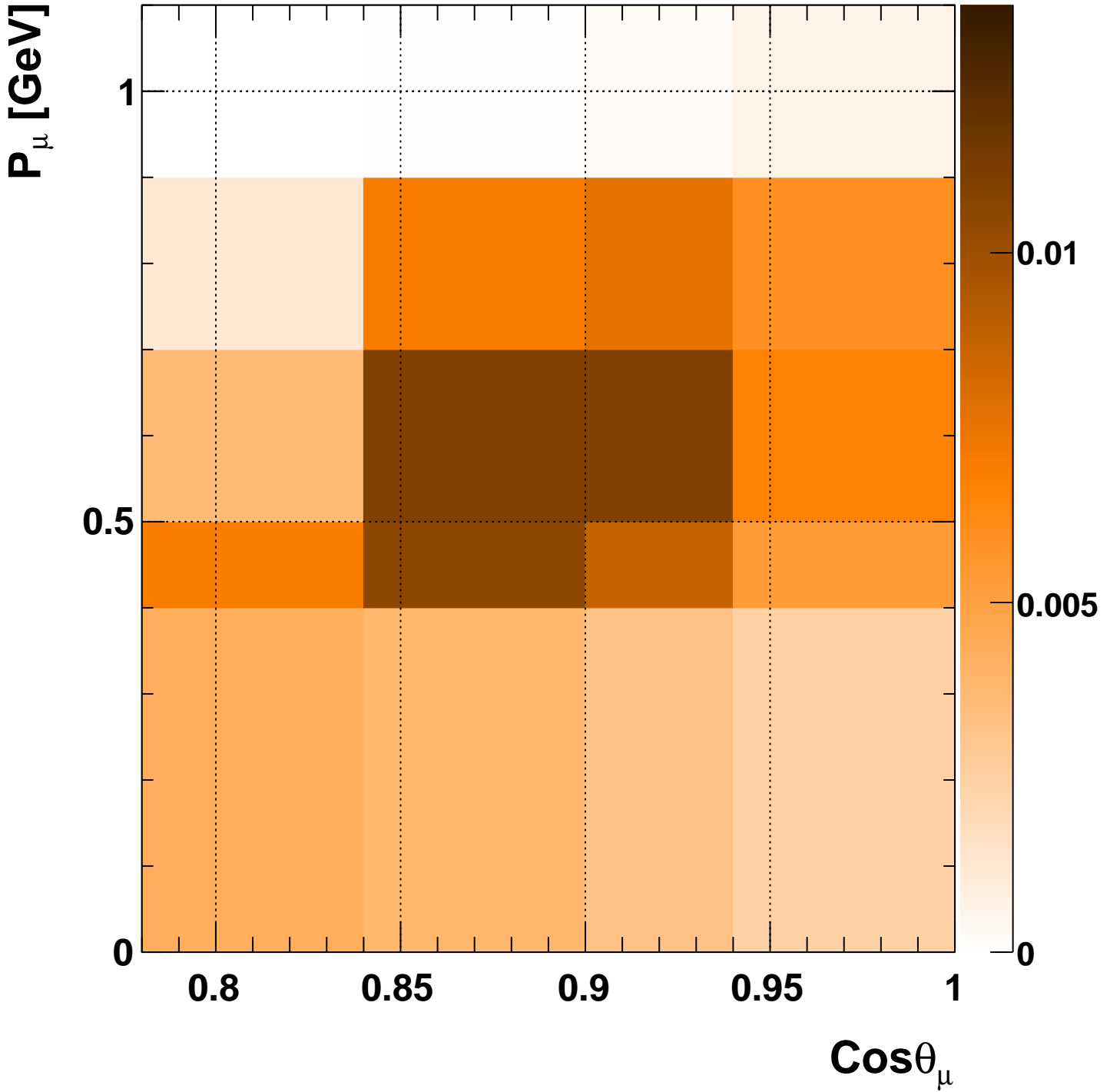


(pred - data)/ σ



(pred - data) / data





$\frac{\partial^2 \sigma}{\partial \text{Cos}\theta_\mu \partial P_\mu} [10^{-38} \text{ cm}^2/\text{GeV}]$

Pred: RESFix:G18_02a_00_000:t2k_nd280_numu_fhc

t2k_nd280_numucc_2013

VS

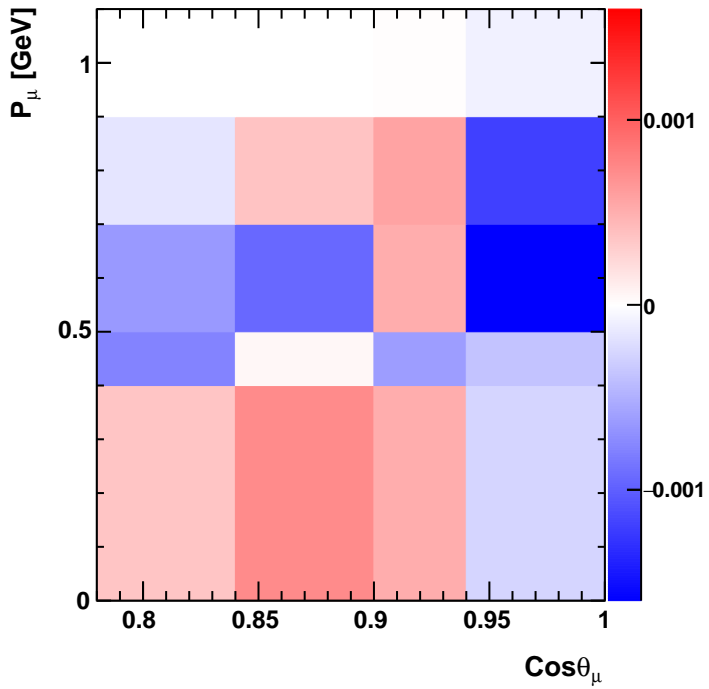
RESFix:G18_02a_00_000:t2k_nd280_numu_fhc

$\partial^2 \sigma / \partial \text{Cos}\theta_\mu \partial P_\mu$

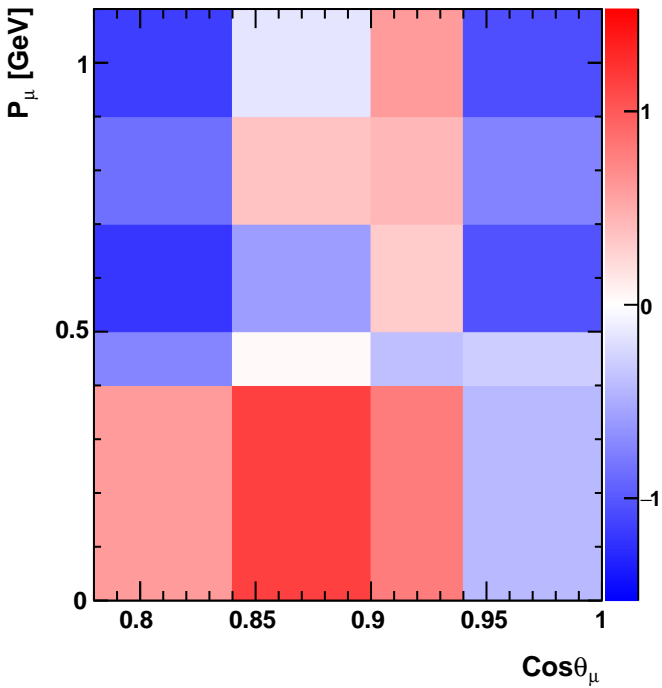
[10⁻³⁸ cm²/GeV]

$\chi^2 = 30.168/20$ DoF

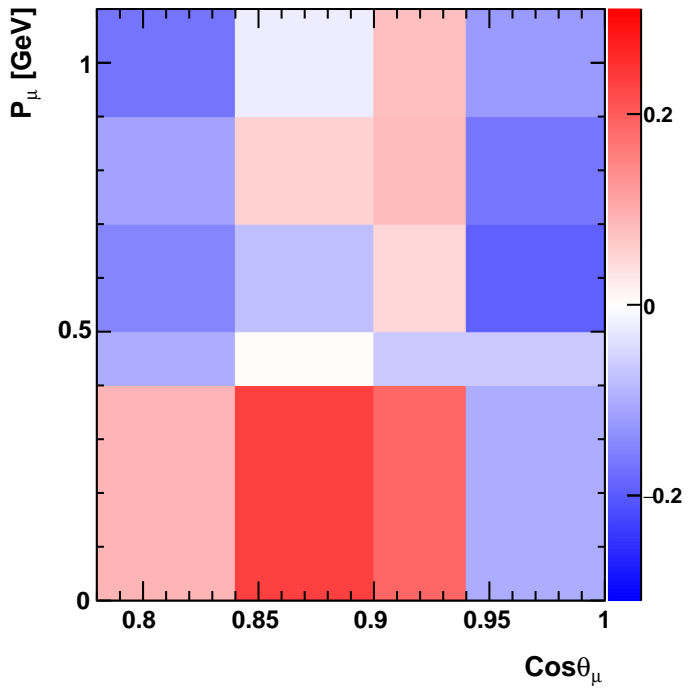
pred - data

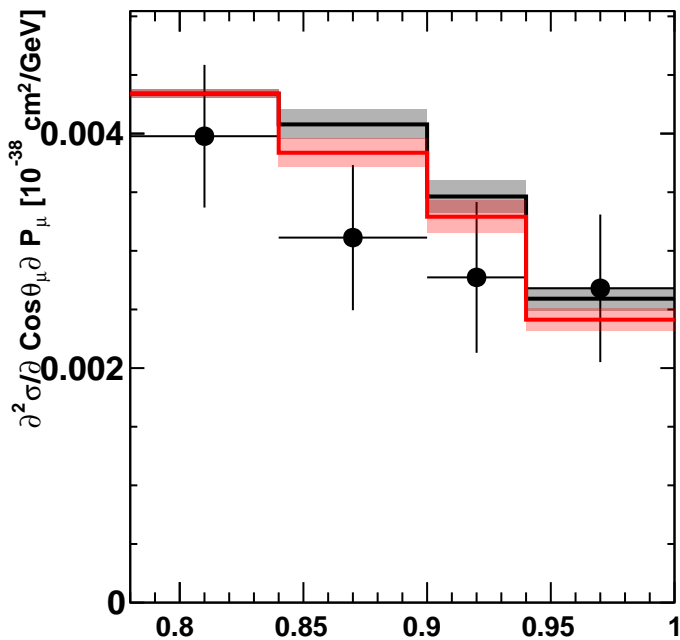


(pred - data)/ σ

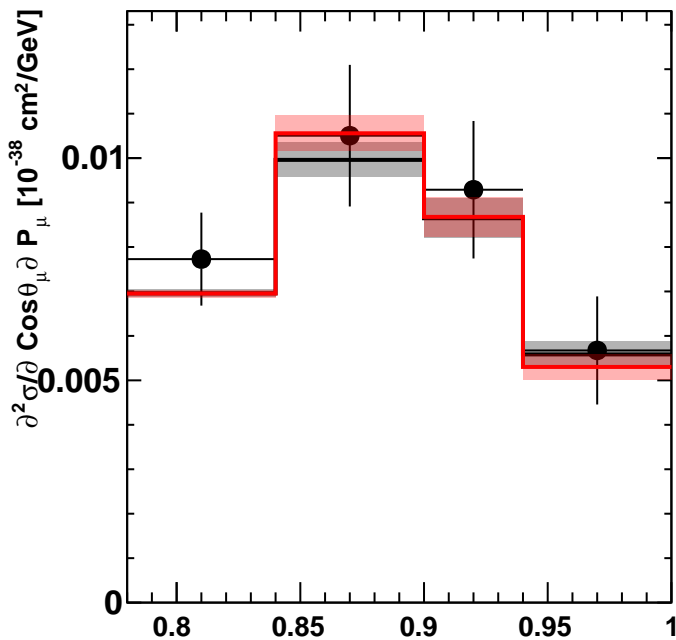


(pred - data) / data

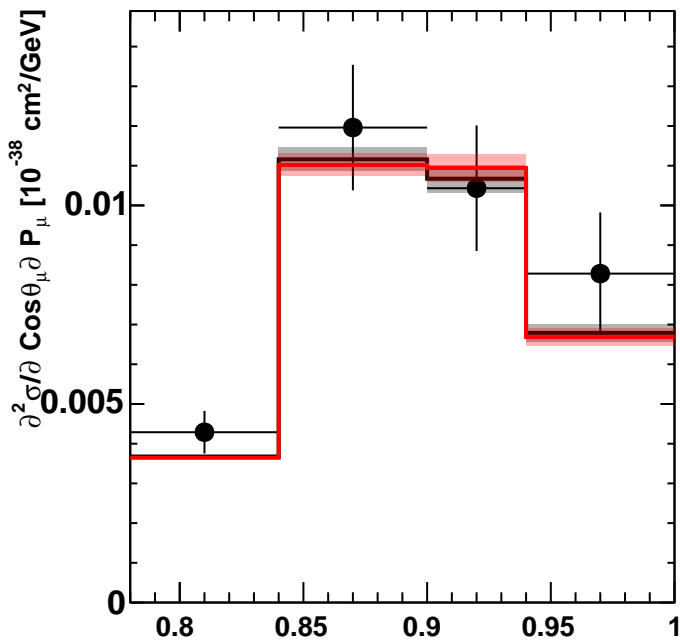


$P_\mu \in [0; 0.4] \text{ GeV}$ 

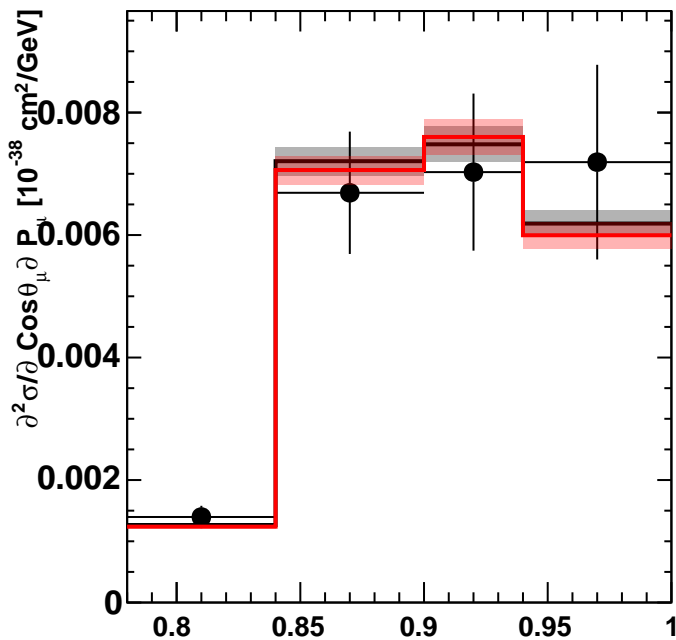
● t2k_nd280_numucc_2013

— master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 4.95/4$ DoF— RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 4.22/4$ DoF $\cos \theta_\mu$ $P_\mu \in [0.4; 0.5] \text{ GeV}$ 

● t2k_nd280_numucc_2013

— master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 0.715/4$ DoF— RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 0.948/4$ DoF $\cos \theta_\mu$ $P_\mu \in [0.5; 0.7] \text{ GeV}$ 

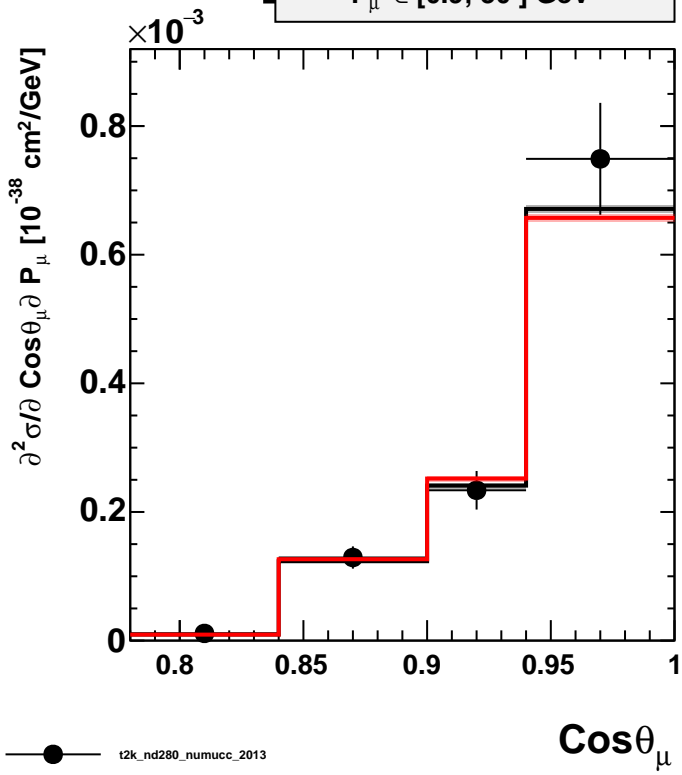
● t2k_nd280_numucc_2013




— master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.56/4$ DoF— RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 3.24/4$ DoF $\cos \theta_\mu$ $P_\mu \in [0.7; 0.9] \text{ GeV}$ 

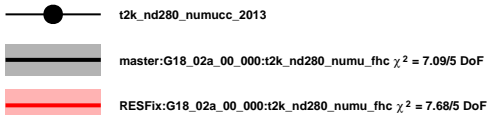
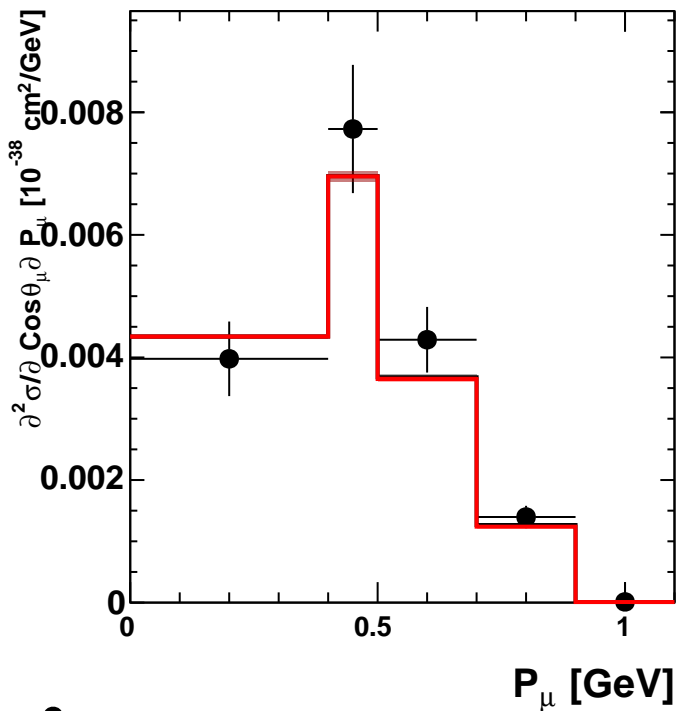
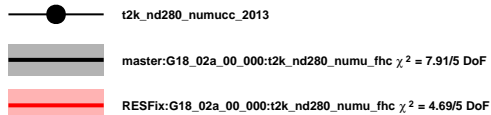
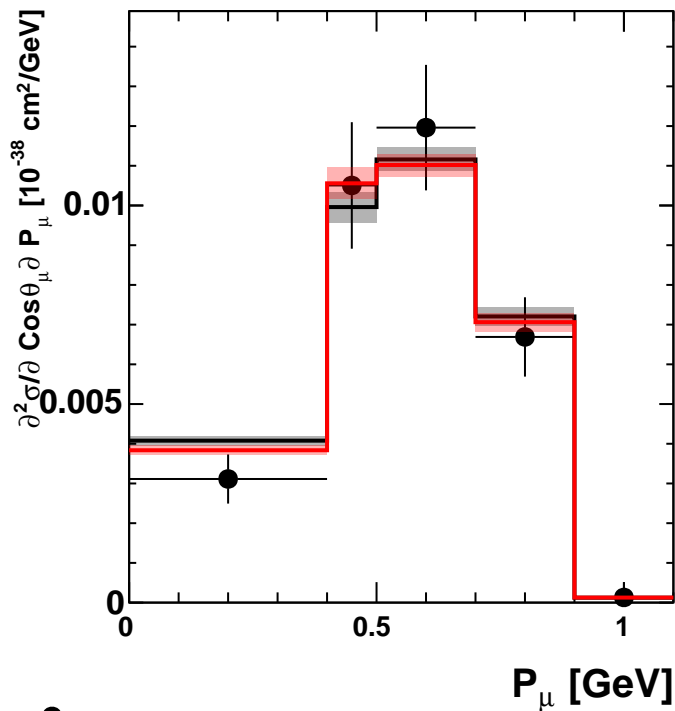
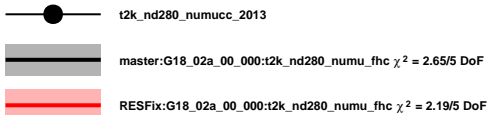
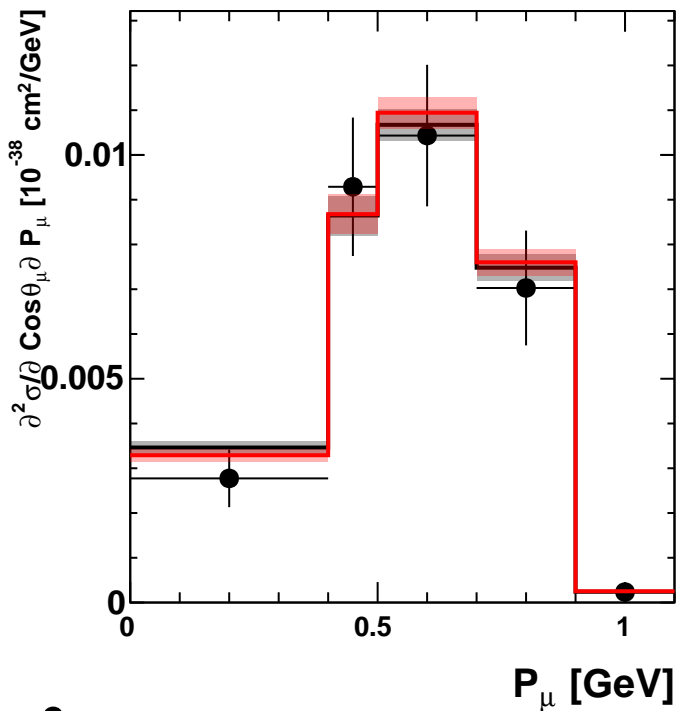
● t2k_nd280_numucc_2013

— master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.07/4$ DoF— RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 2.28/4$ DoF $\cos \theta_\mu$

$P_\mu \in [0.9; 30] \text{ GeV}$



-  t2k_nd280_numucc_2013
-  master:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 5.43/4$ DoF
-  RESFix:G18_02a_00_000:t2k_nd280_numu_fhc $\chi^2 = 10.8/4$ DoF

$\text{Cos}\theta_\mu \in [0; 0.84]$  $\text{Cos}\theta_\mu \in [0.84; 0.9]$  $\text{Cos}\theta_\mu \in [0.9; 0.94]$  $\text{Cos}\theta_\mu \in [0.94; 1]$ 