RHC Results

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Indiana Collaboration Meeting

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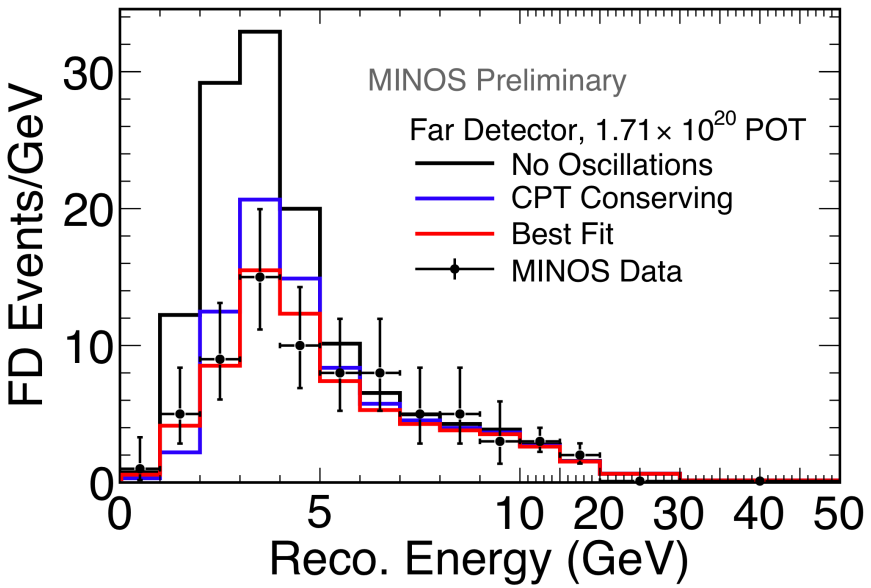
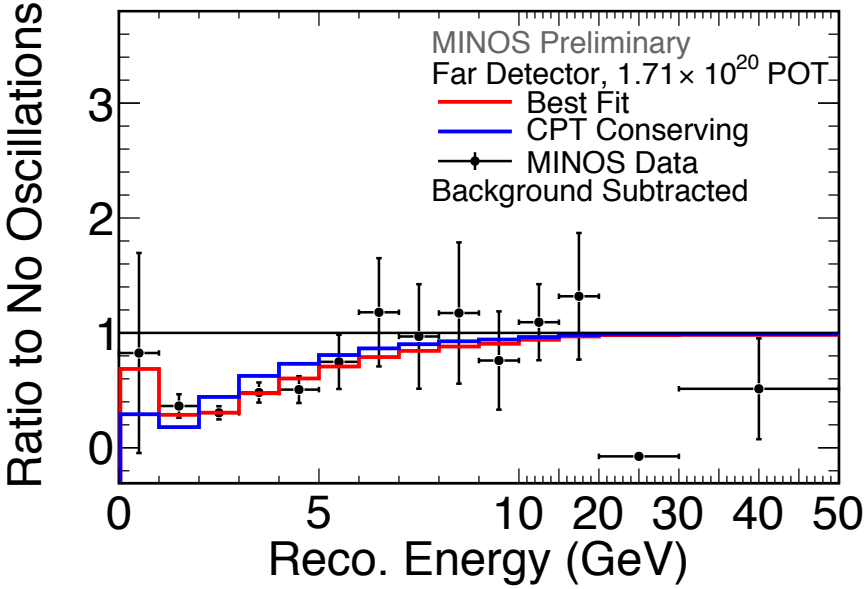
What's new?



- Integrated numbers now only go up to 50 GeV, which is the range used in the fit.
- All results updated with the remade helpers that give consistent results with Gwen.
- Better (still not perfect) errors on the ratio plot
  - Errors now calculated before rebinning
  - Still getting too little error on the 20-30 GeV bin
- Fixed the scale in the binned chisquared plot
- Added these plots:
  - Spectrum in the fit binning
  - Contour with/without FC, Systematics
  - Contour up to 3σ

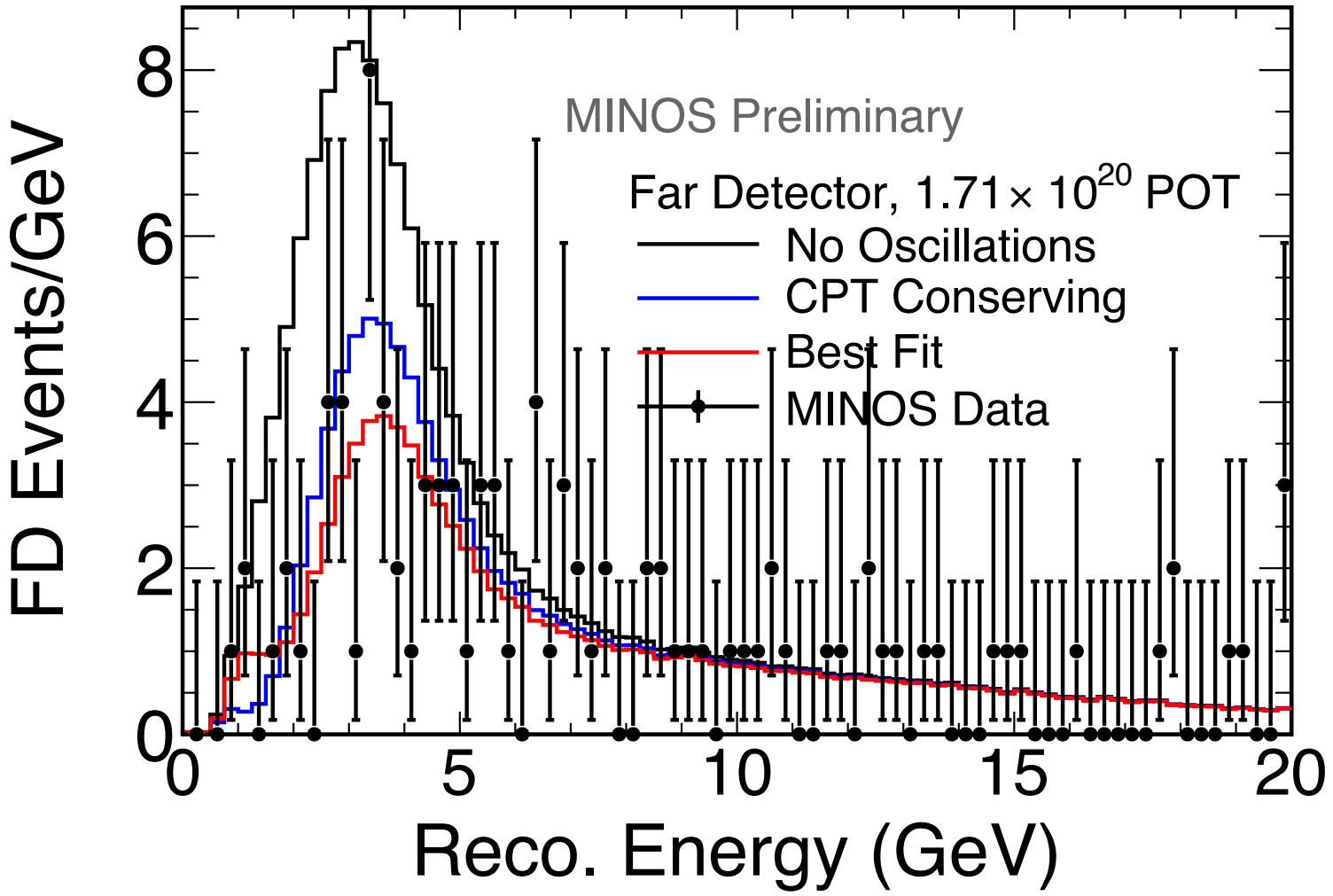
FD Spectrum





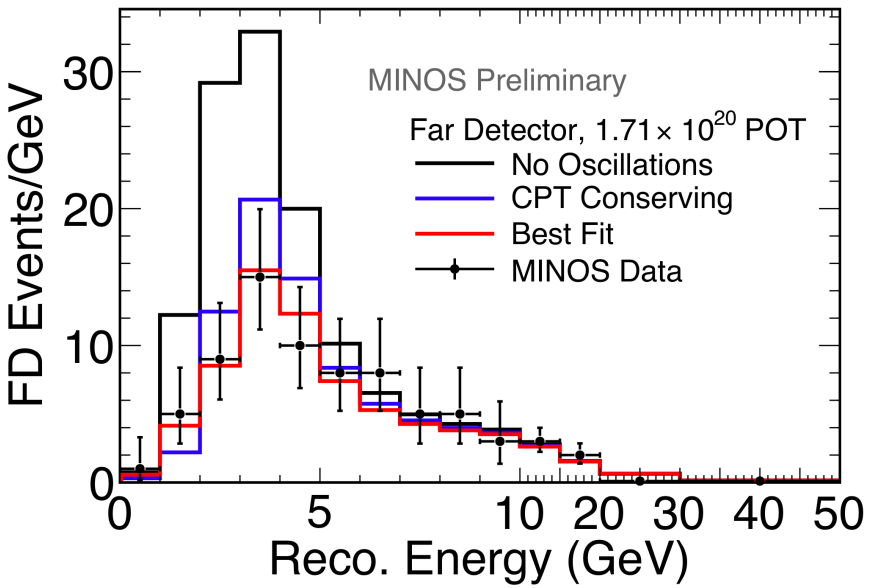
- The RHC results: 97 selected events
- Best Fit: (3.36e-3, 0.86)

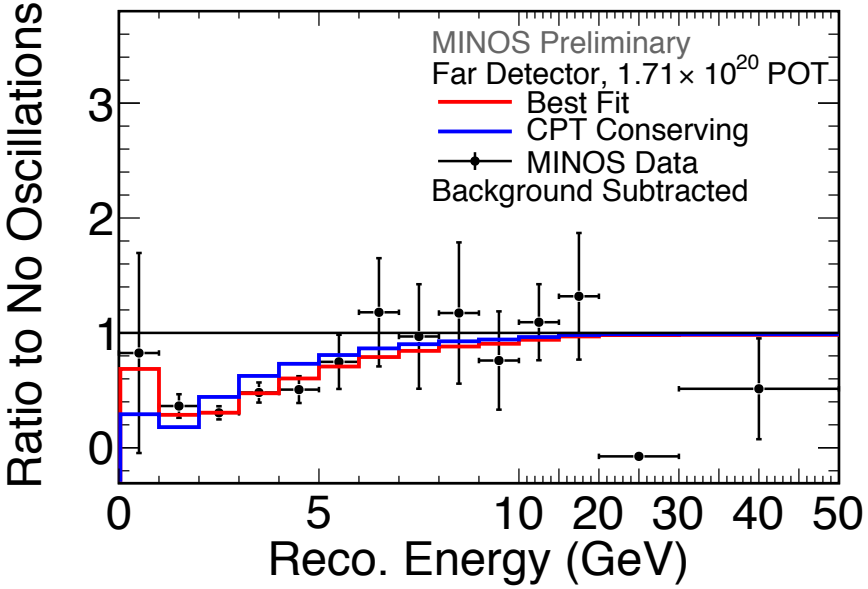
FD Spectrum

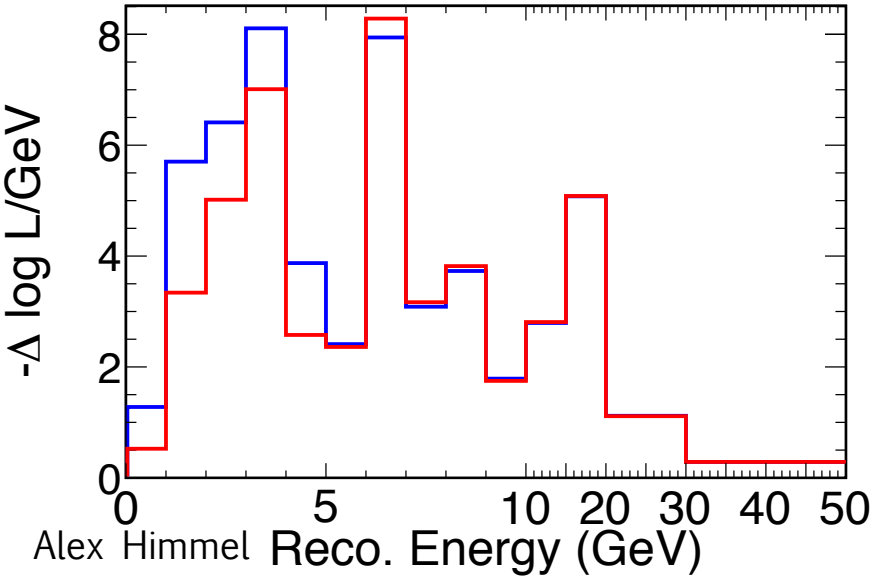


- The spectrum we actually fit.

Why are we so far from CPT?







- At left is the likelihood contribution from each bin.
- If you add up the difference between the red and blue you will get 6.4.



What's going on above 20 GeV?



- We get 3 events from 20 GeV to 50 GeV with an expectation of ~9.
- We get 2 events > 50 GeV with an expectation of 1.4

- If we redo the fit with only events below 20 GeV the results are basically identical:
  - The best fit goes from (3.401, 0.8517) to (3.396, 0.8518)



Numbers to be Calculated

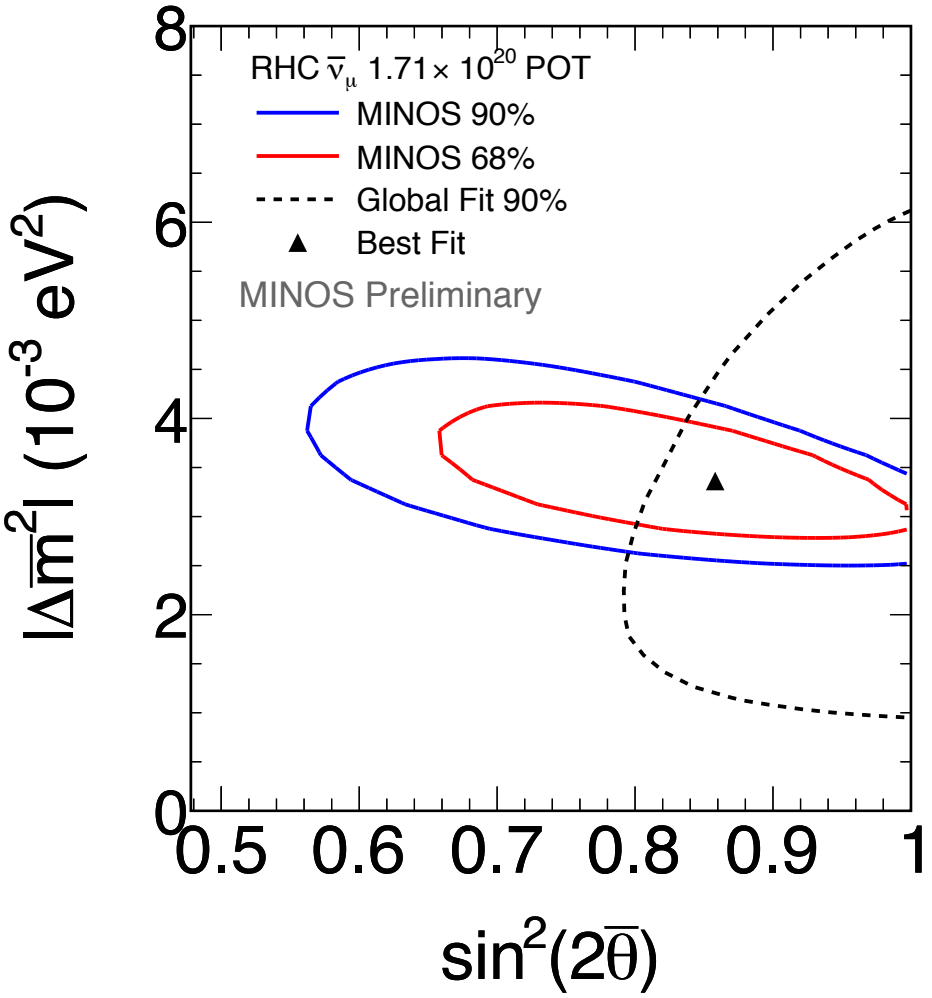


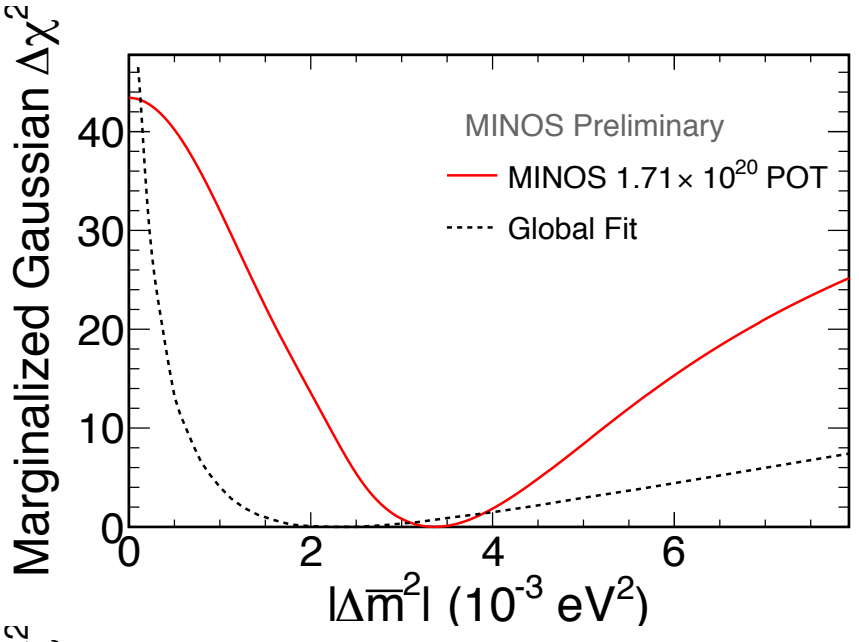
Events	97				
CPT Expected	107	±	10 (stat)	±	5 (syst)
No Osc. Expected	156	±	12 (stat)	±	7 (syst)
Δm^2	3.36	±	+0.45 -0.40 (stat)	±	0.06 (syst)
$\sin^2(2\theta)$	0.86	±	0.11 (stat)	±	0.01 (syst)
χ^2/d.o.f.	94.2/98	=	0.96	,	p=0.59
$\Delta\chi^2$ to CPT	6.4	=	1.9σ (FC)	,	2.1σ (Gauss)
$\Delta\chi^2$ to No Osc	43.4	=	6.3σ*		
Count-only	(156-97)/14	=	4.2σ		

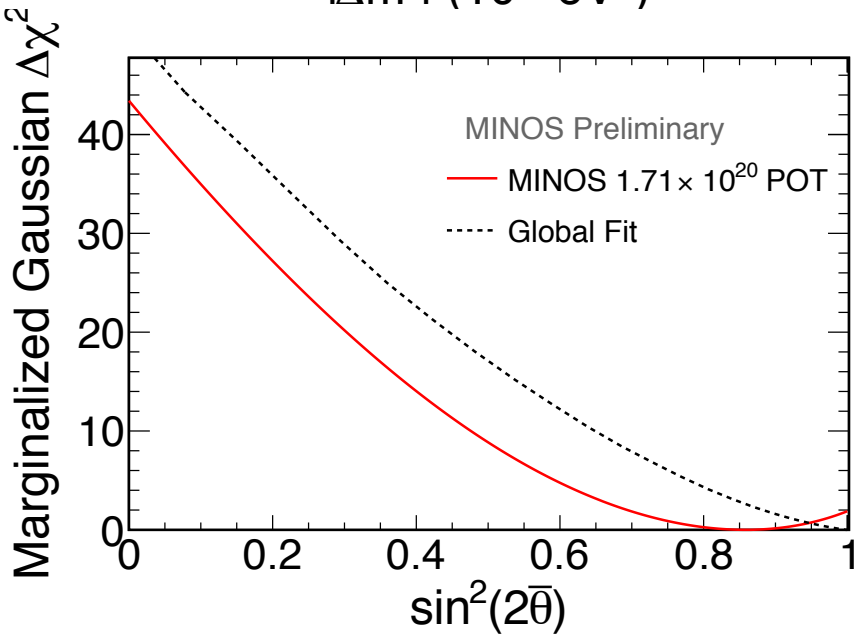
- The numbers above are gaussian, stats-only unless otherwise specified.

* Above ~3 sigma, FC corrections become both small and impractical to calculate.

Contours

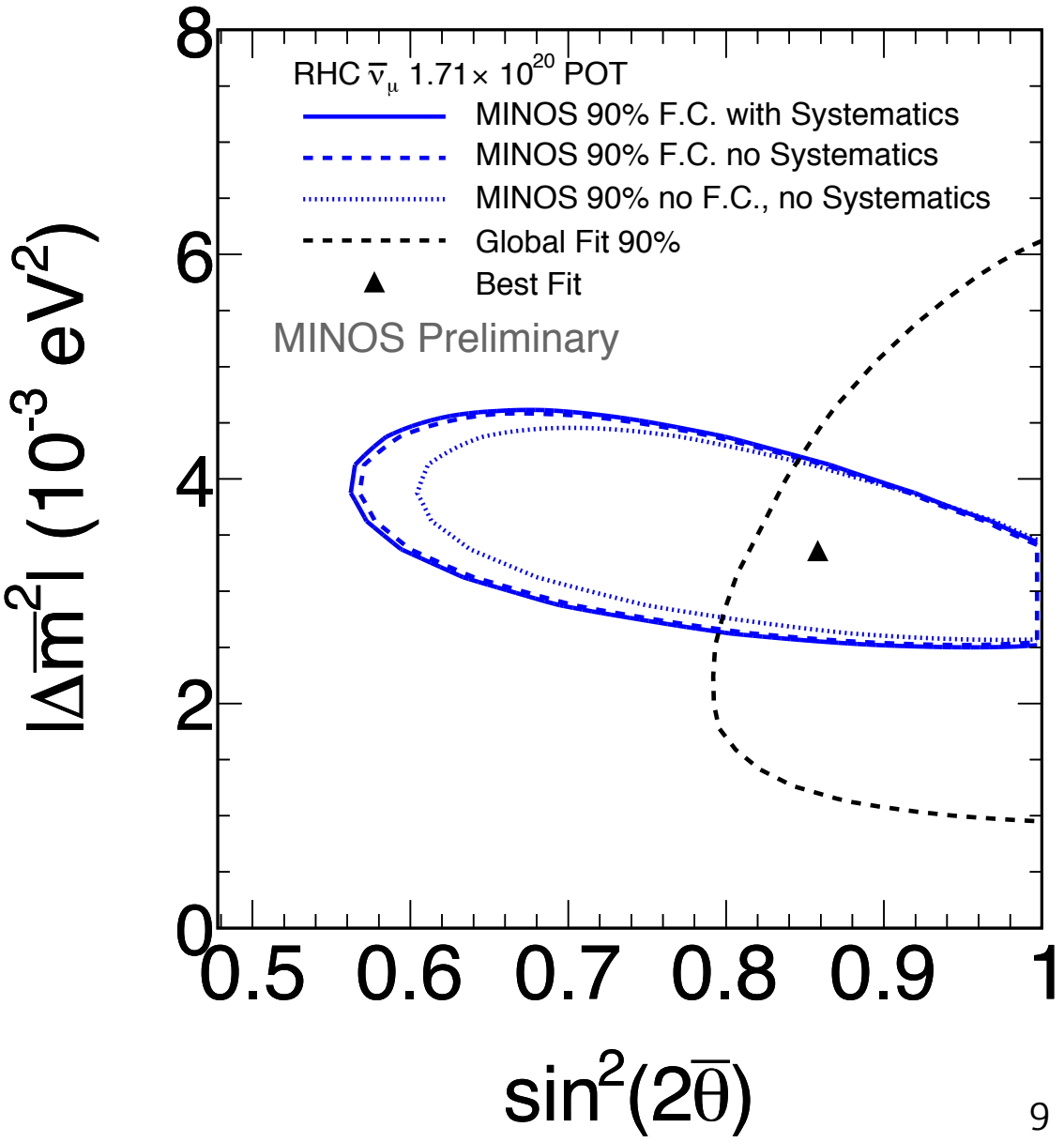

RHC $\bar{\nu}_\mu$ 1.71×10^{20} POT
MINOS 90%
MINOS 68%
Global Fit 90%
Best Fit
MINOS Preliminary
$|\Delta\bar{m}^2|$ (10^{-3} eV^2)
$\sin^2(2\bar{\theta})$


MINOS Preliminary
MINOS 1.71×10^{20} POT
Global Fit
Marginalized Gaussian $\Delta\chi^2$
$|\Delta\bar{m}^2|$ (10^{-3} eV^2)

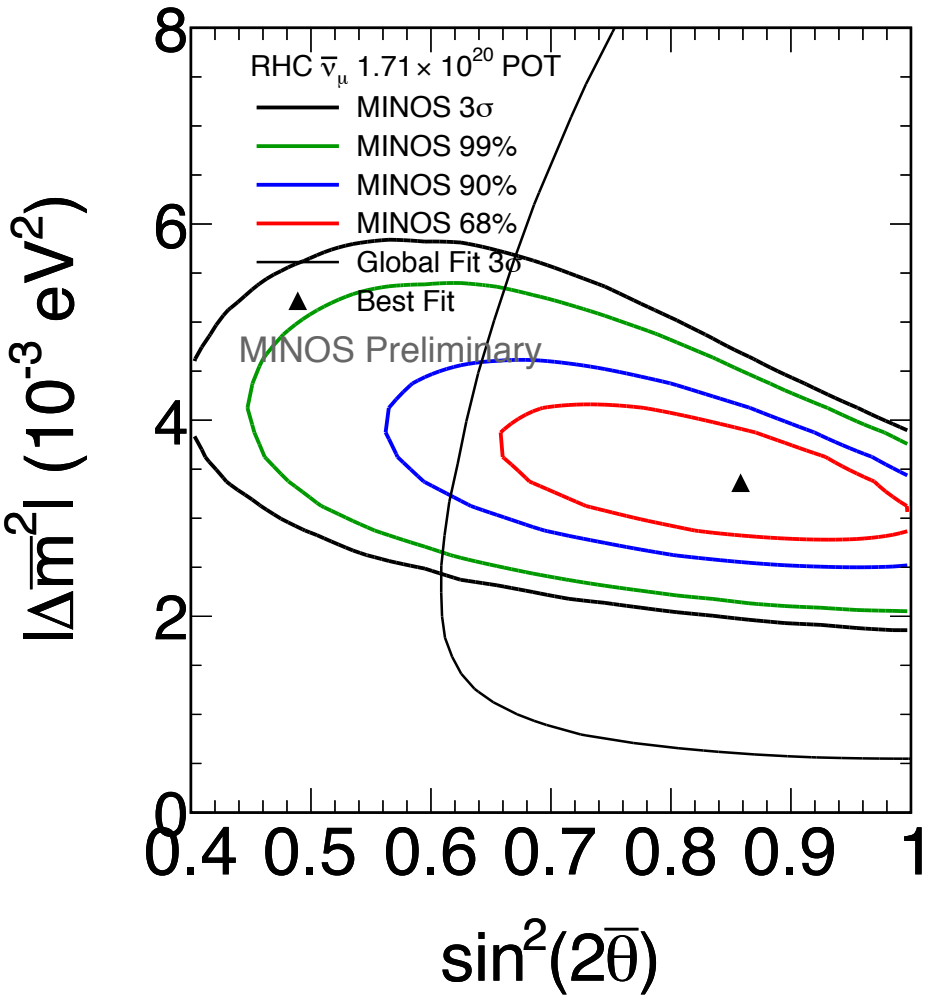

MINOS Preliminary
MINOS 1.71×10^{20} POT
Global Fit
Marginalized Gaussian $\Delta\chi^2$
$\sin^2(2\bar{\theta})$

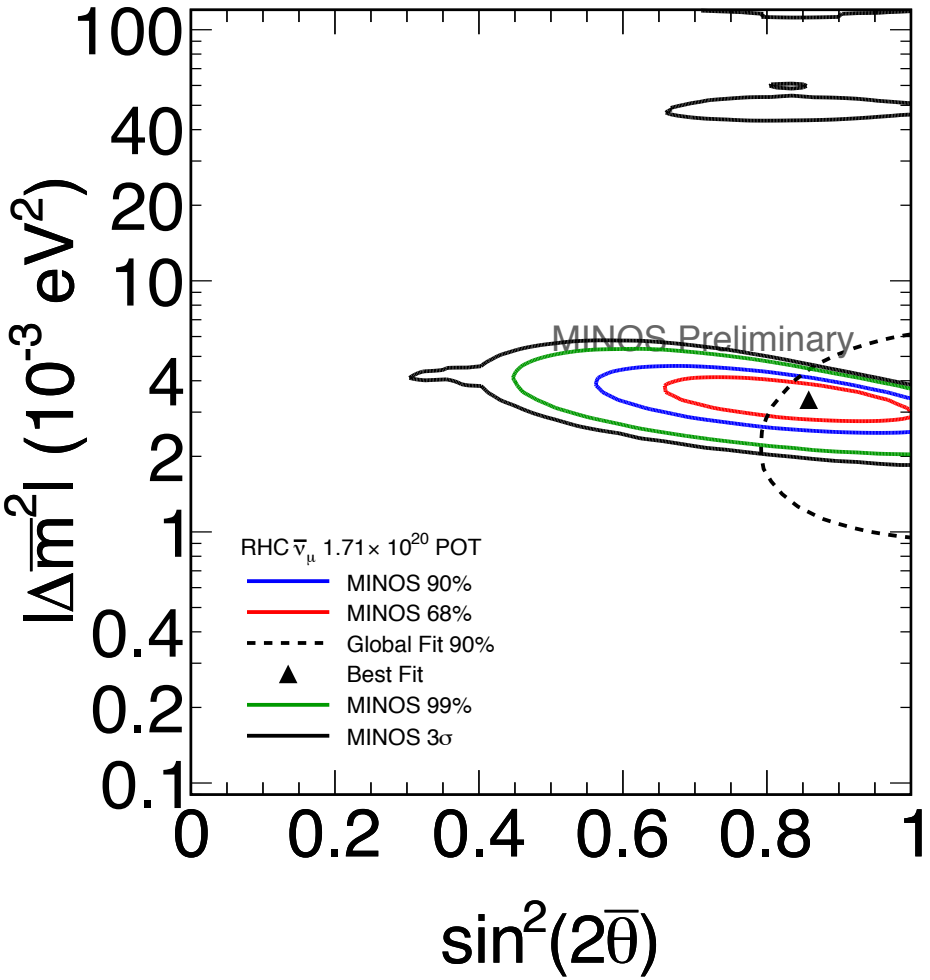
Contours

- Here's the 90% contour with and without systematics, Feldman-Cousins.
- As anticipated:
- Systematics have little effect
- Feldman-Cousins makes most of its difference at low mixing angle.



Contours


RHC $\bar{\nu}_\mu$ 1.71 × 10^{20} POT
MINOS 3σ
MINOS 99%
MINOS 90%
MINOS 68%
Global Fit 3σ
Best Fit
MINOS Preliminary
$|\Delta\bar{m}^2|$ (10^{-3} eV^2)
$\sin^2(2\bar{\theta})$


MINOS Preliminary
RHC $\bar{\nu}_\mu$ 1.71 × 10^{20} POT
MINOS 90%
MINOS 68%
Global Fit 90%
Best Fit
MINOS 99%
MINOS 3σ
$|\Delta\bar{m}^2|$ (10^{-3} eV^2)
$\sin^2(2\bar{\theta})$