Some Analyses with A Liquid Argon Time Projection Chamber (LArTPC) in GLoBES

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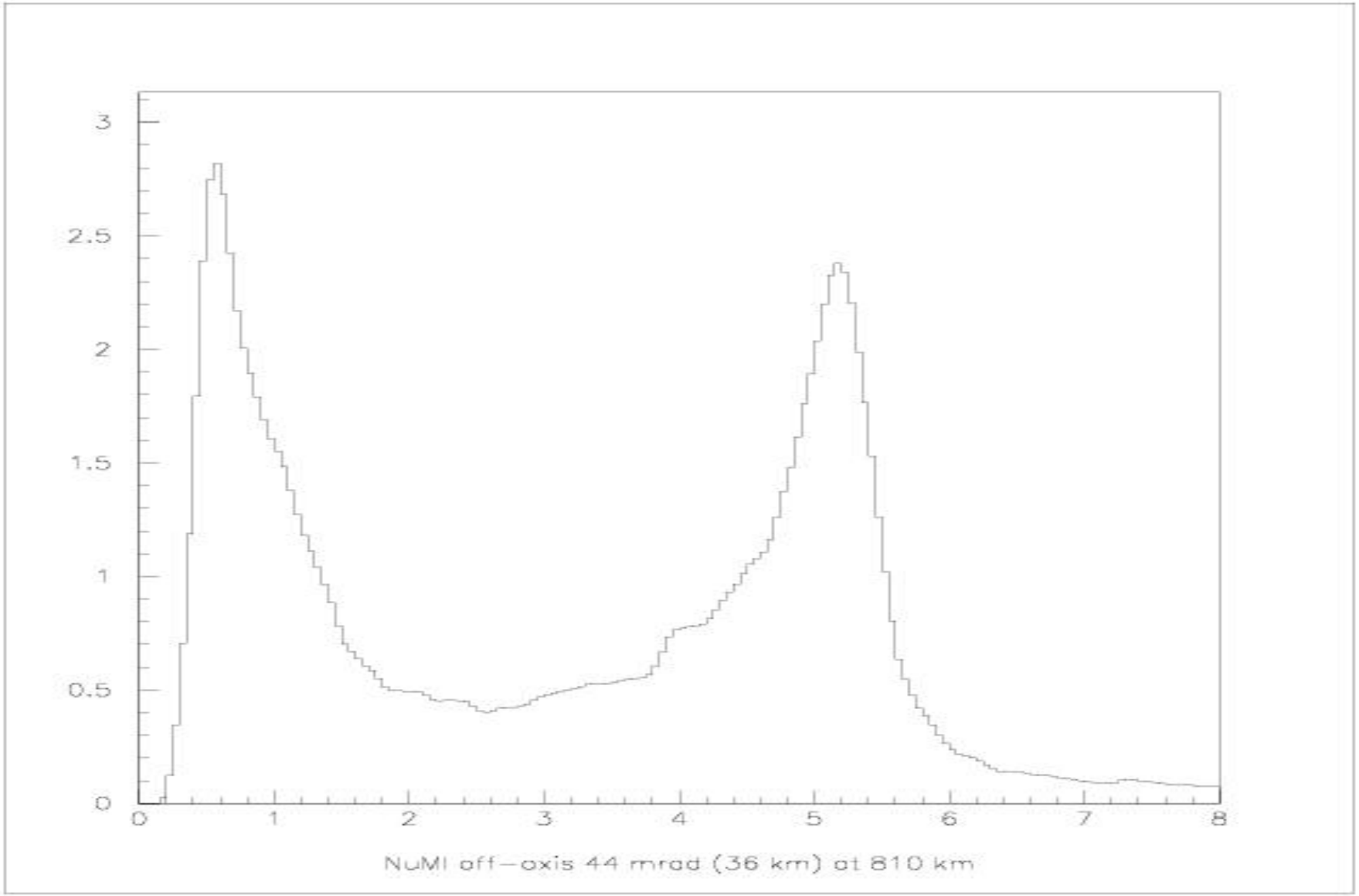
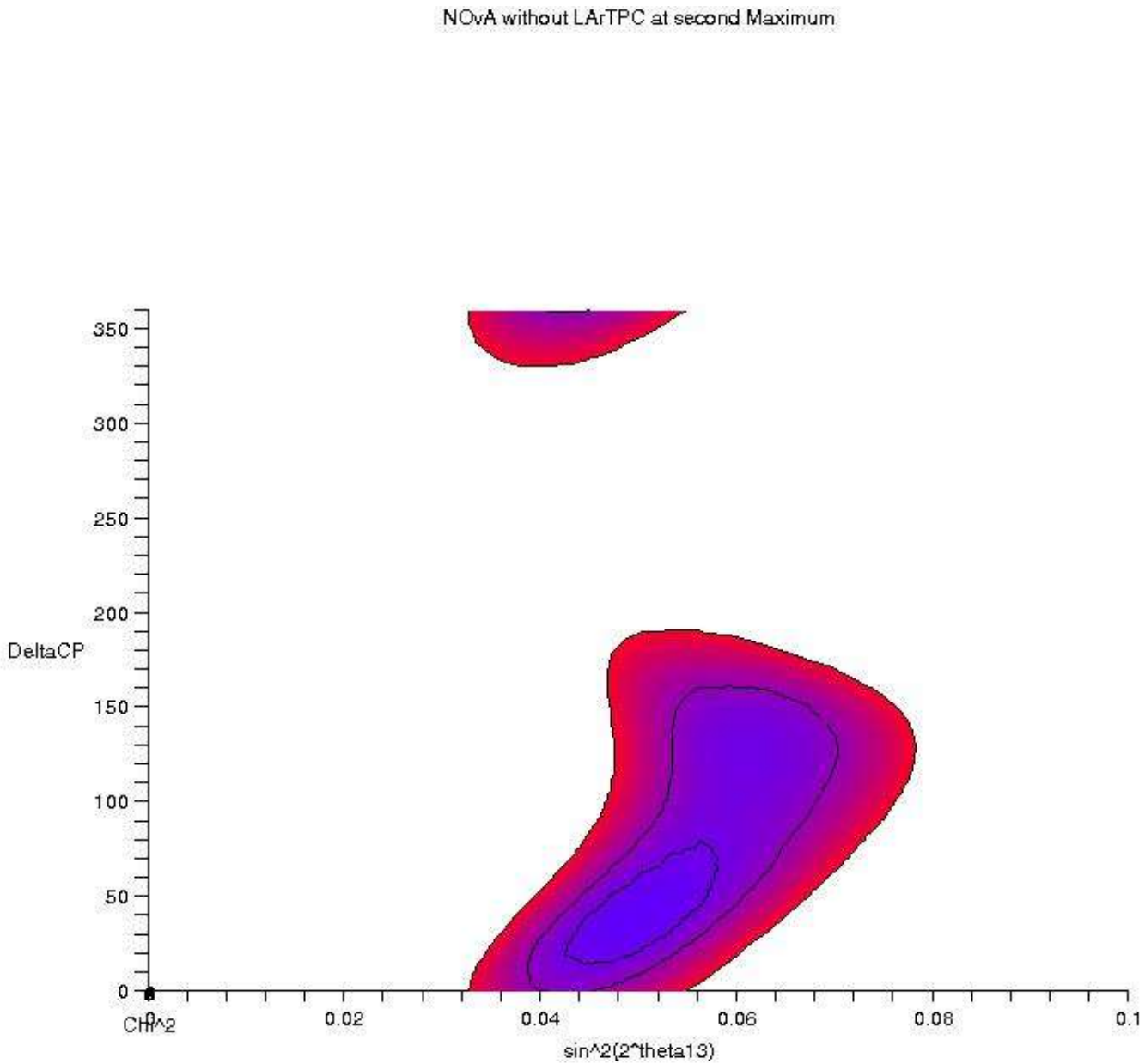
A 50 kt LArTPC at the 2nd Maximum

```
flux(#plus34)<
        @flux_file="NoVA-810-34.dat"
        @time = 3
        @stored_muons = 25*10^20 /* for the proton driver use 25*10^20 */
        @norm = 3.256*10^-16
>
flux(#minus34)<
        @flux_file="NoVA-810-34-anti.dat"
        @time = 3
        @stored_muons = 25*10^20 /* for the proton driver use 25*10^20 */
        @norm = 3.256*10^-16
>
$target_mass =  50.0
$emin =         0.4
$emax =         1.2
```

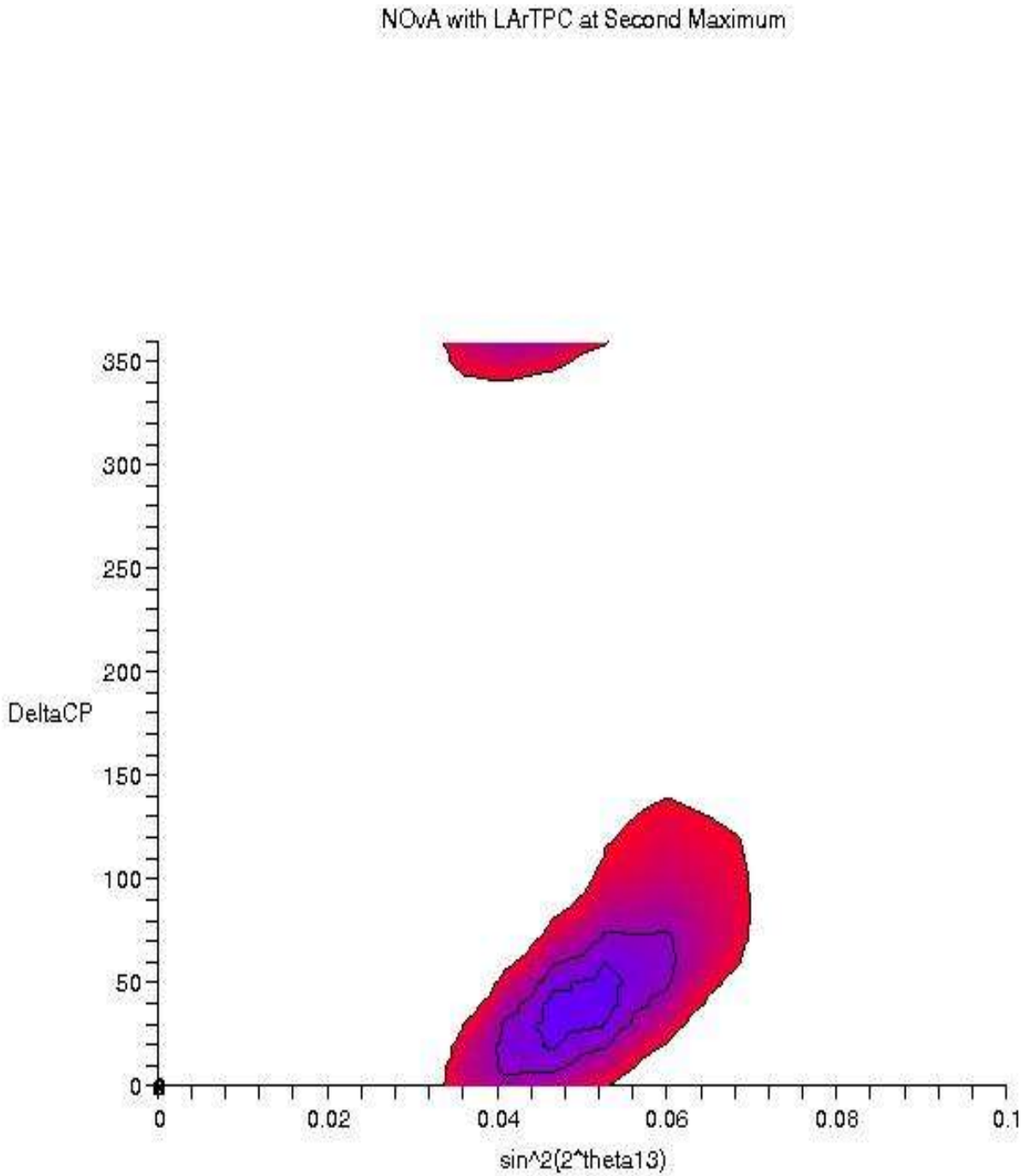
“Really” off-axis spectrum at NovA location



NovA Alone

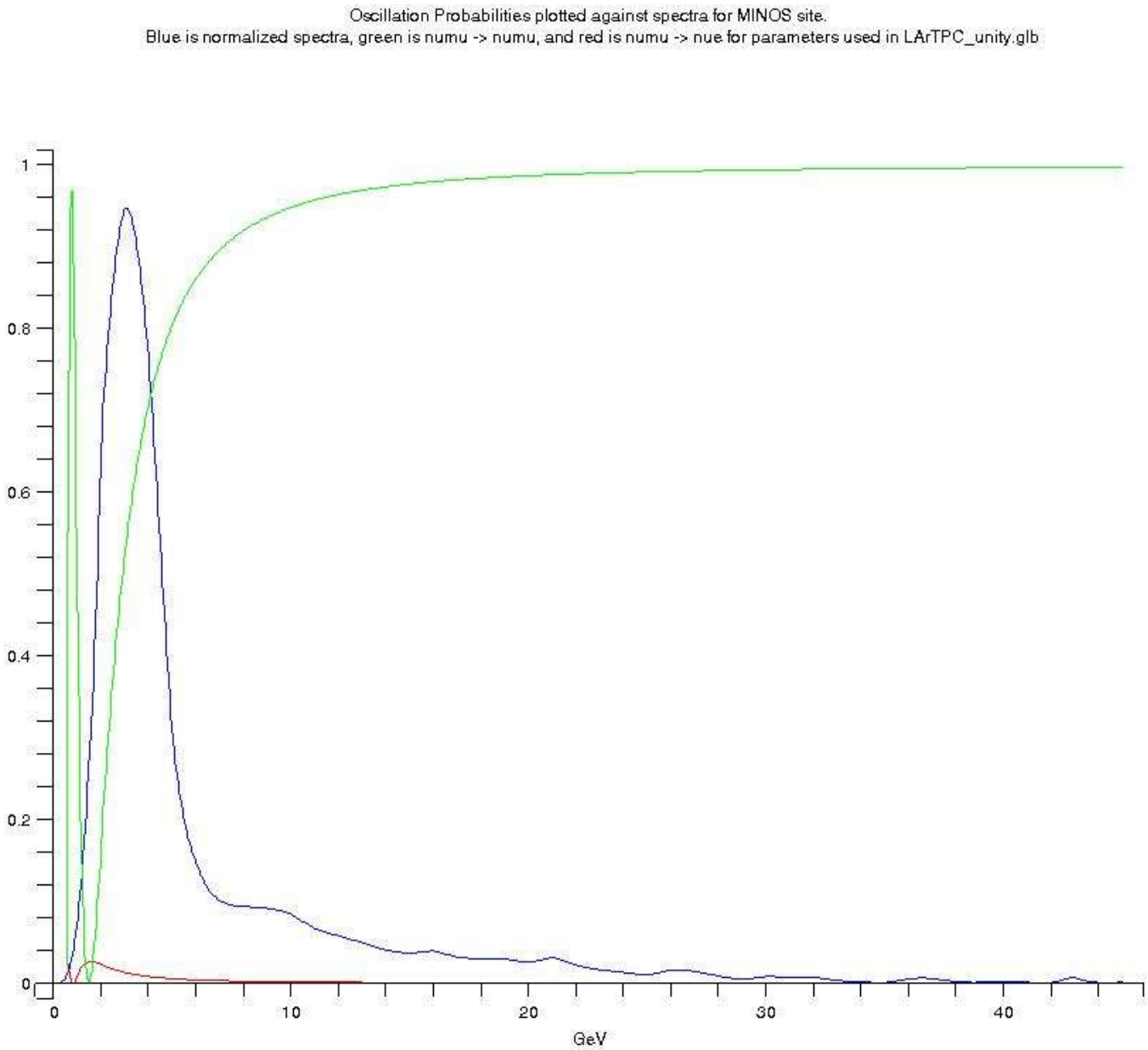

NOvA without LArTPC at second Maximum
DeltaCP
350
300
250
200
150
100
50
0
Chi^2
0
0.02
0.04
0.06
0.08
0.1
sin^2(2^theta13)

NovA with LArTPC

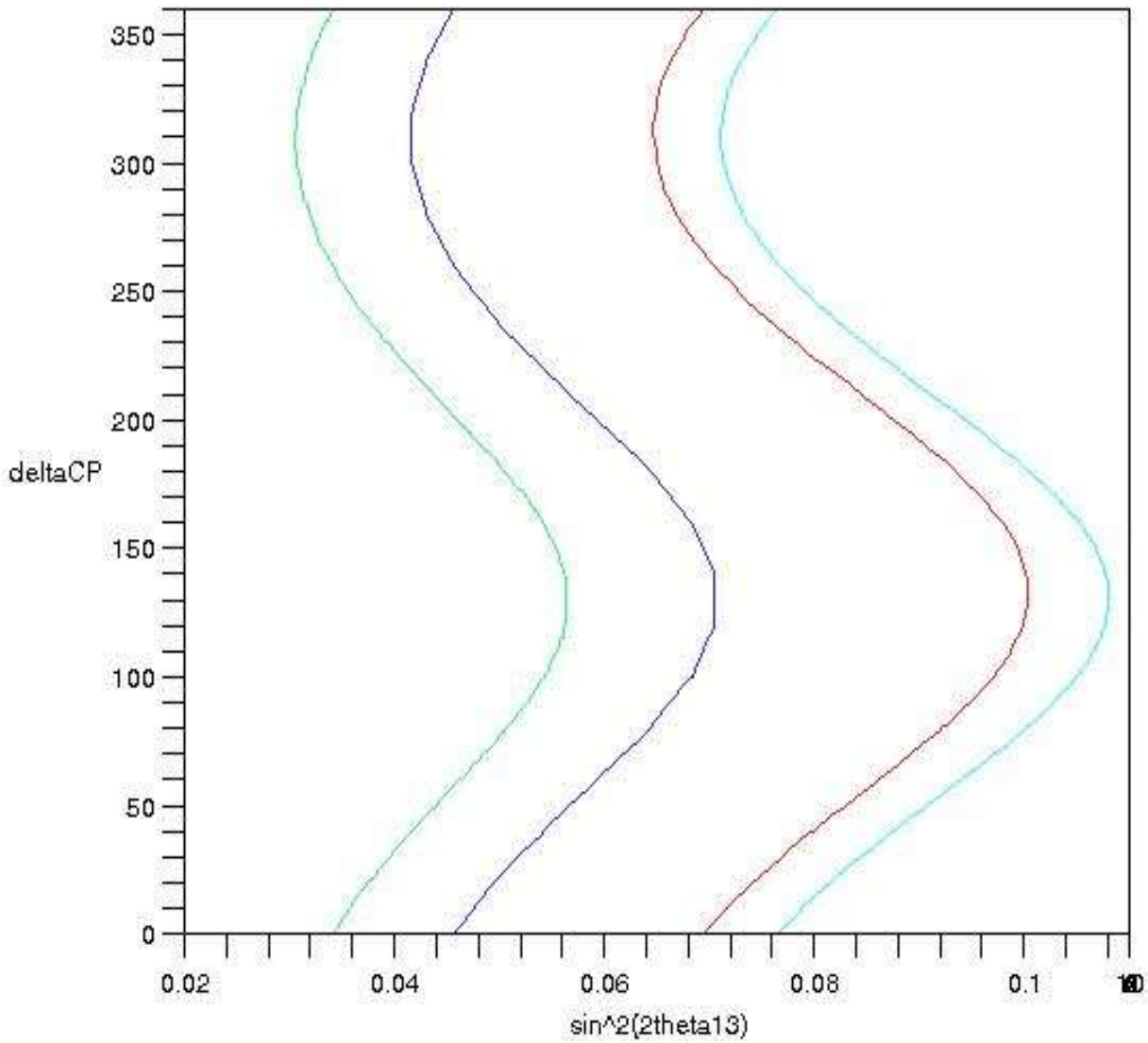


LarTPC on the Surface at Soudan

- test the sin^2(2theta_13) sensitivity for 1 to 3 kton LarTPC for LE beam



Sensitivity limit of sin^2(2theta13) vs deltaCP for various detectors
Red=Minos, Green=3kt detector, Purple=2kt detector, Turquoise=1kt Detector



Conclusions

- GLoBES is a fantastic tool but it is somewhat difficult to get a realistic detector description into it. (e.g.,
- @background = 0.0003@#nu_mu_disappearance_CC : 0.005@#nu_mu_disappearance_NC : 0.5@#nu_e_beam : 0.005@#nu_e_appearance_NC
- @backgrounderror = 0.05 : 0.0001
- Getting anything out of siting a detector at the second maximum at 810 km looks pretty tough.
- Even a moderate sized (few kton) LarTPC on the surface at Soudan has good sin^2(2\theta_13) sensitivity.