

Physics Plots for CDR

Elizabeth Worcester

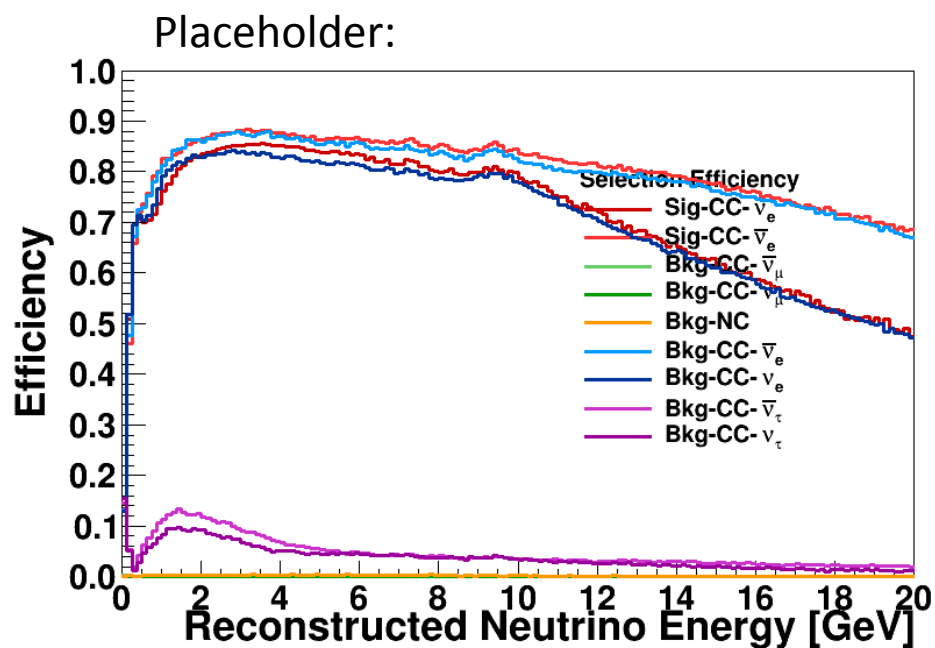
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Volume II - Physics

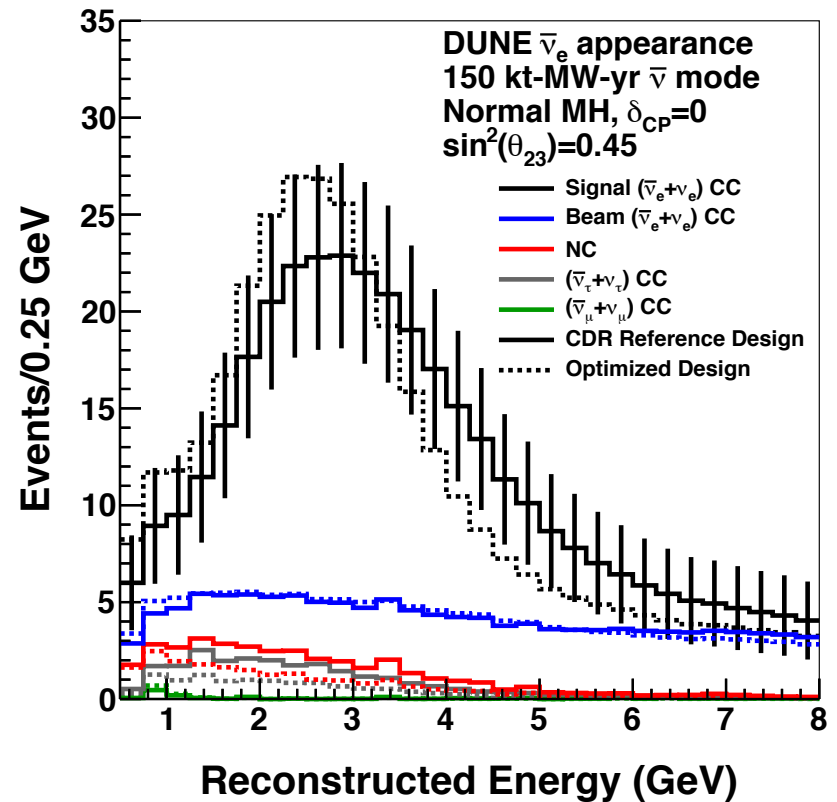
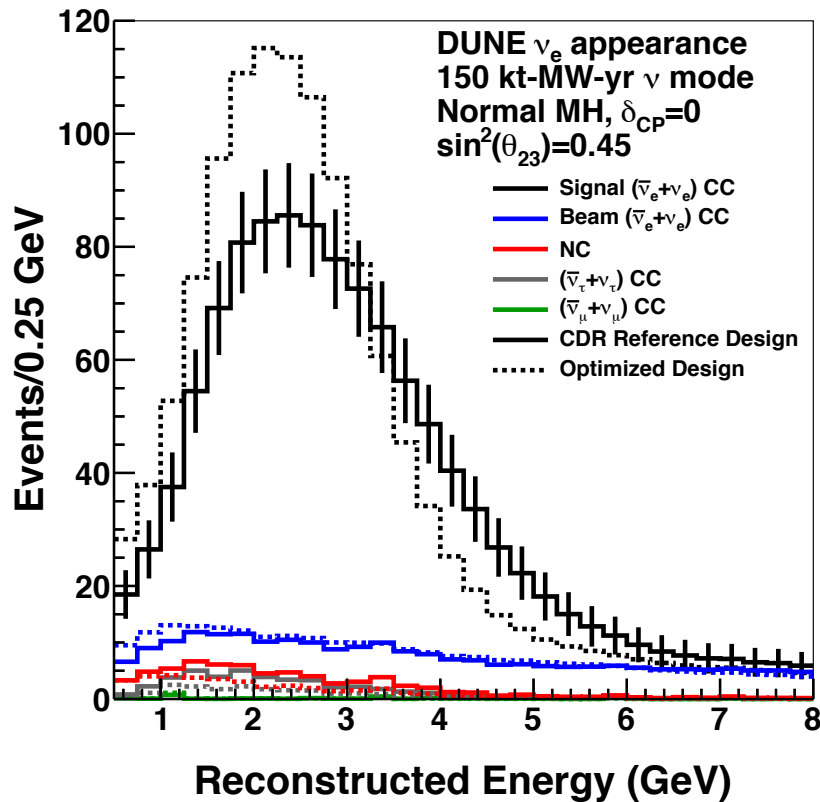
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Fast MC Inputs

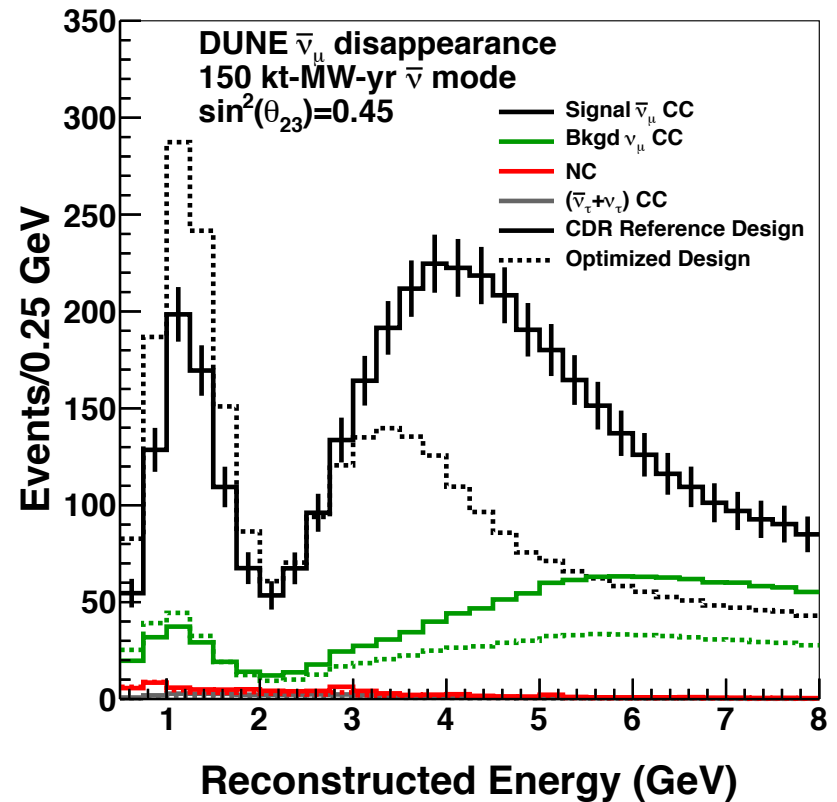
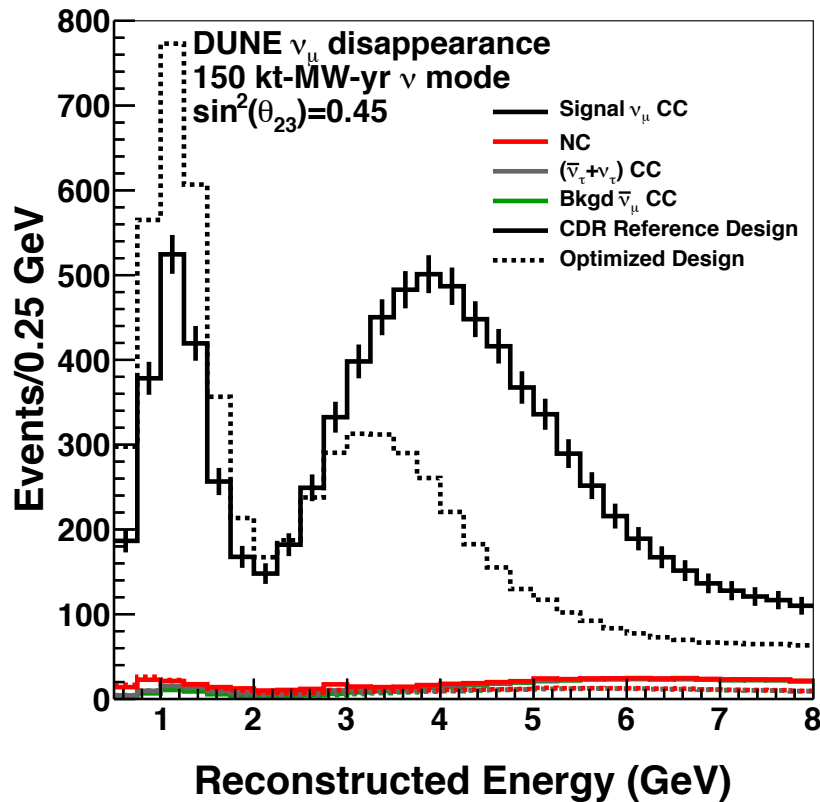
- Now all spectra and physics studies based on Fast MC outputs
 - Smearing
 - Efficiencies
 - KNN cuts against NC and ν_τ



Appearance Spectra



Disappearance Spectra

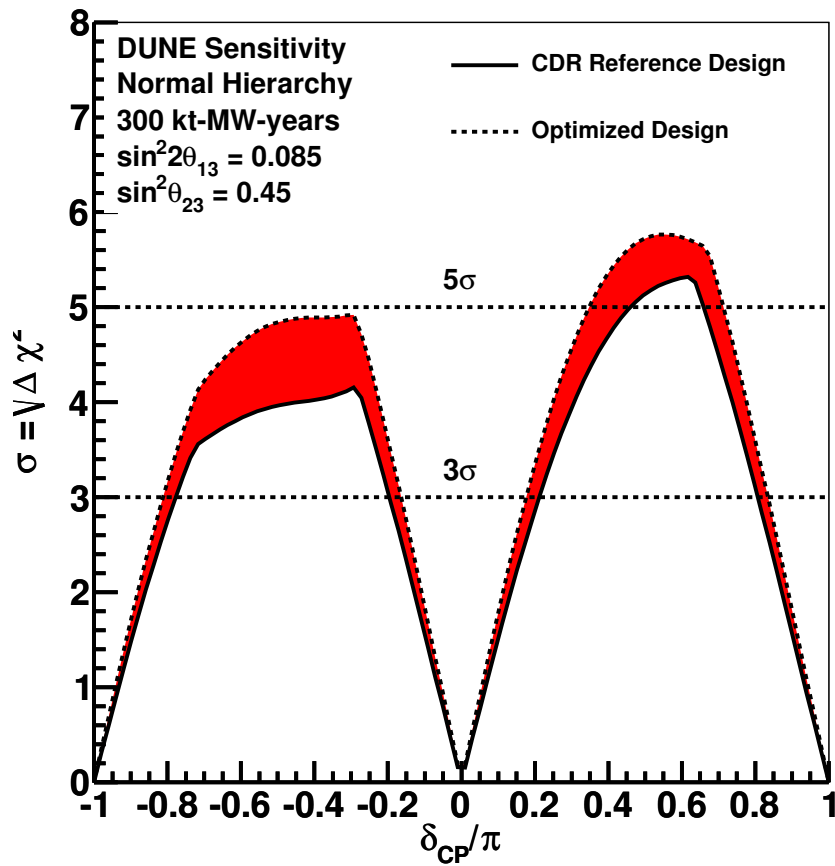


Event Rate

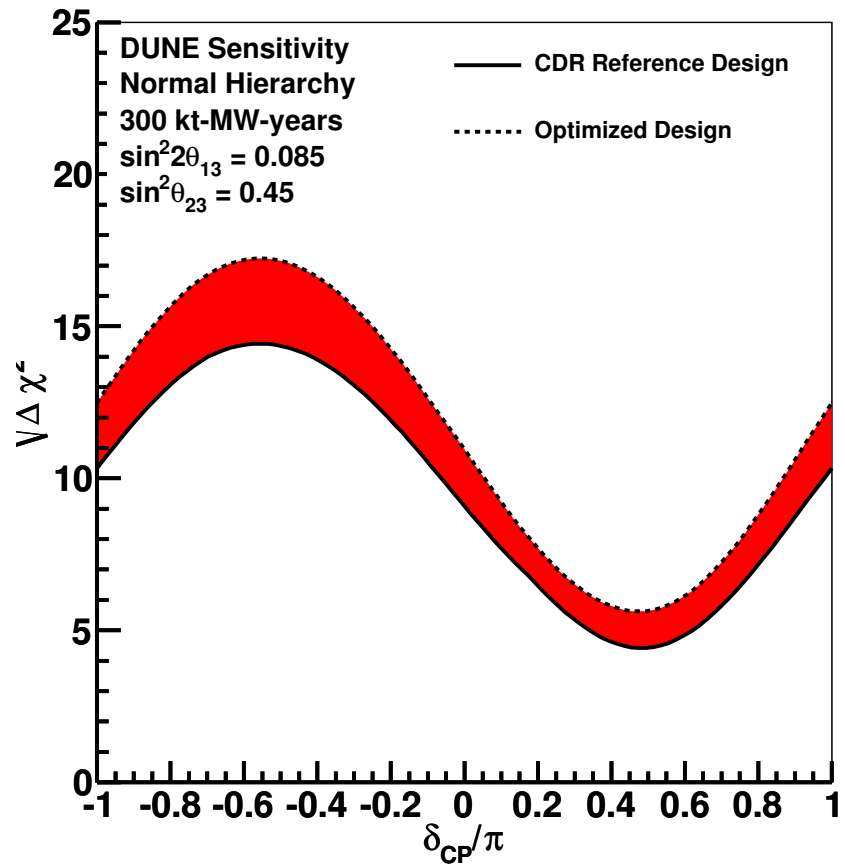
	CDR Reference Design	Optimized Design
ν mode (150 kt-MW-yr)		
ν_e Signal NH (IH)	881 (510)	968 (538)
$\bar{\nu}_e$ Signal NH (IH)	17 (29)	11 (23)
Total Signal NH (IH)	898 (539)	979 (561)
Beam $\nu_e + \bar{\nu}_e$ CC Bkgd	284	293
NC Bkgd	30	26
$\nu_\tau + \bar{\nu}_\tau$ CC Bkgd	43	20
$\nu_\mu + \bar{\nu}_\mu$ CC Bkgd	3	3
Total Bkgd	360	342
$\bar{\nu}$ mode (150 kt-MW-yr)		
ν_e Signal NH (IH)	68 (43)	52 (31)
$\bar{\nu}_e$ Signal NH (IH)	172 (383)	173 (441)
Total Signal NH (IH)	240 (426)	225 (472)
Beam $\nu_e + \bar{\nu}_e$ CC Bkgd	177	173
NC Bkgd	16	13
$\nu_\tau + \bar{\nu}_\tau$ CC Bkgd	24	11
$\nu_\mu + \bar{\nu}_\mu$ CC Bkgd	2	2
Total Bkgd	219	199

300 kt-MW-years

CP Violation Sensitivity

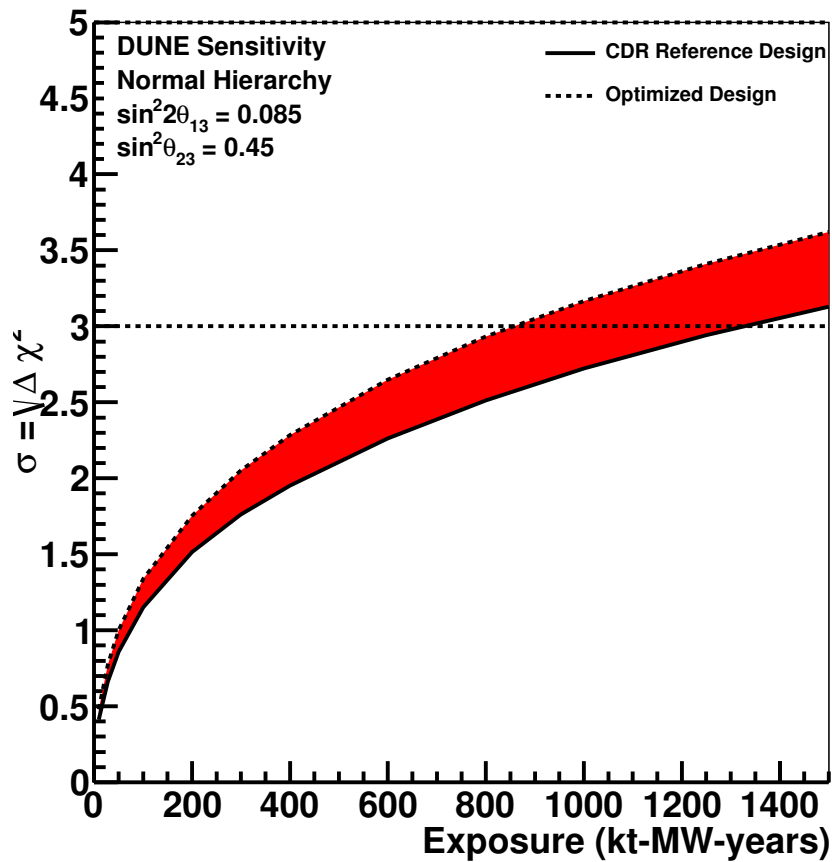


Mass Hierarchy Sensitivity

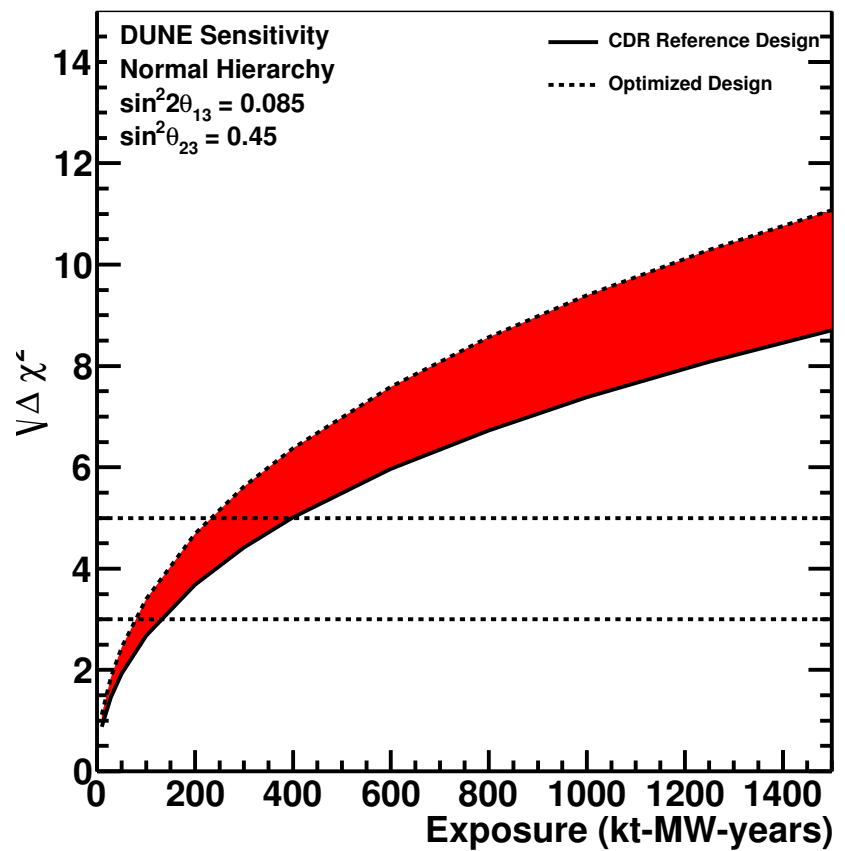


Exposure

75% CP Violation Sensitivity

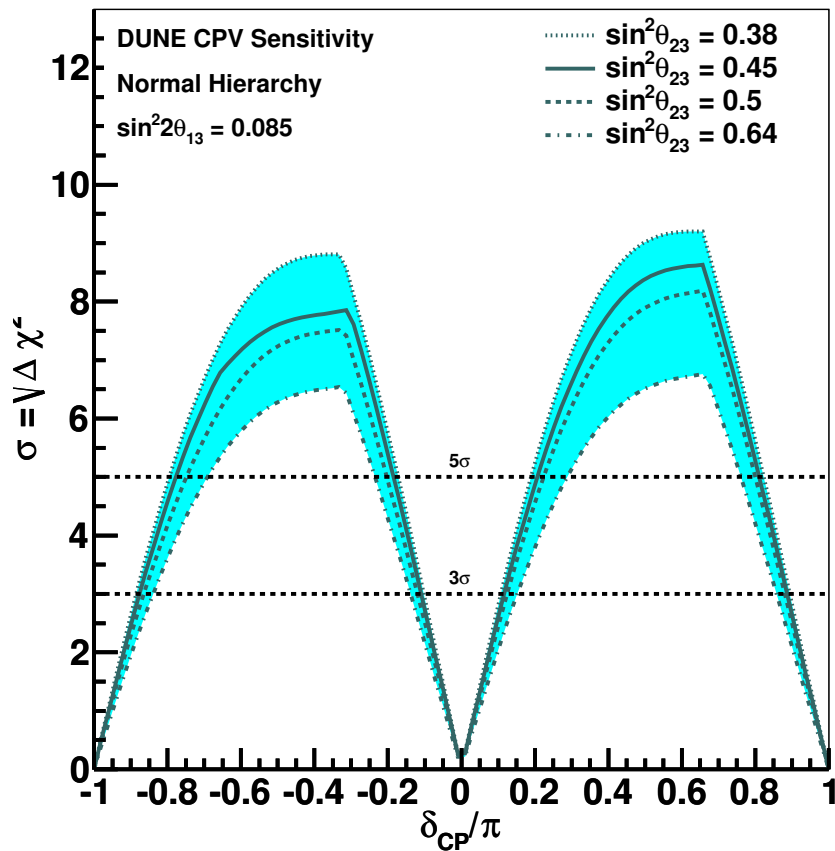


100% MH Sensitivity

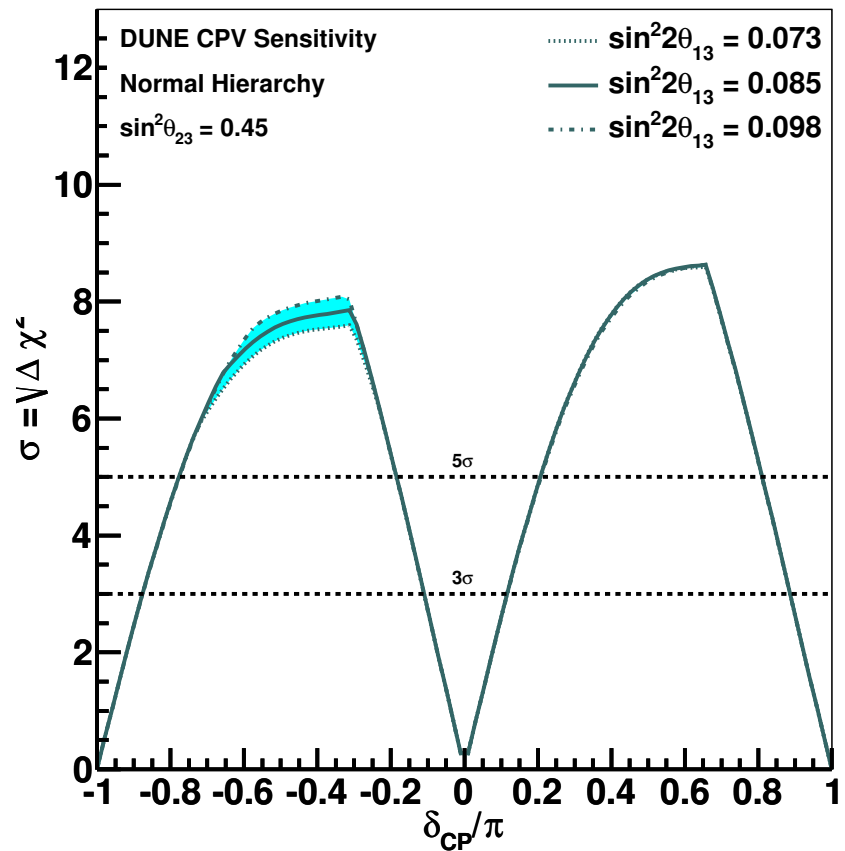


Parameter Variations: CPV

CP Violation Sensitivity



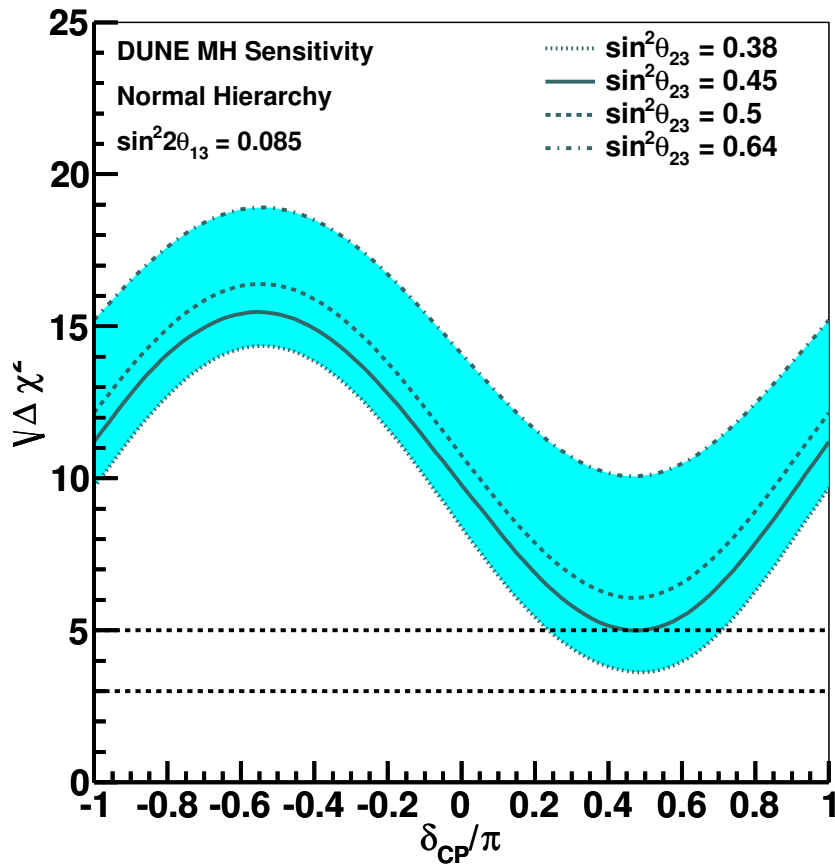
CP Violation Sensitivity



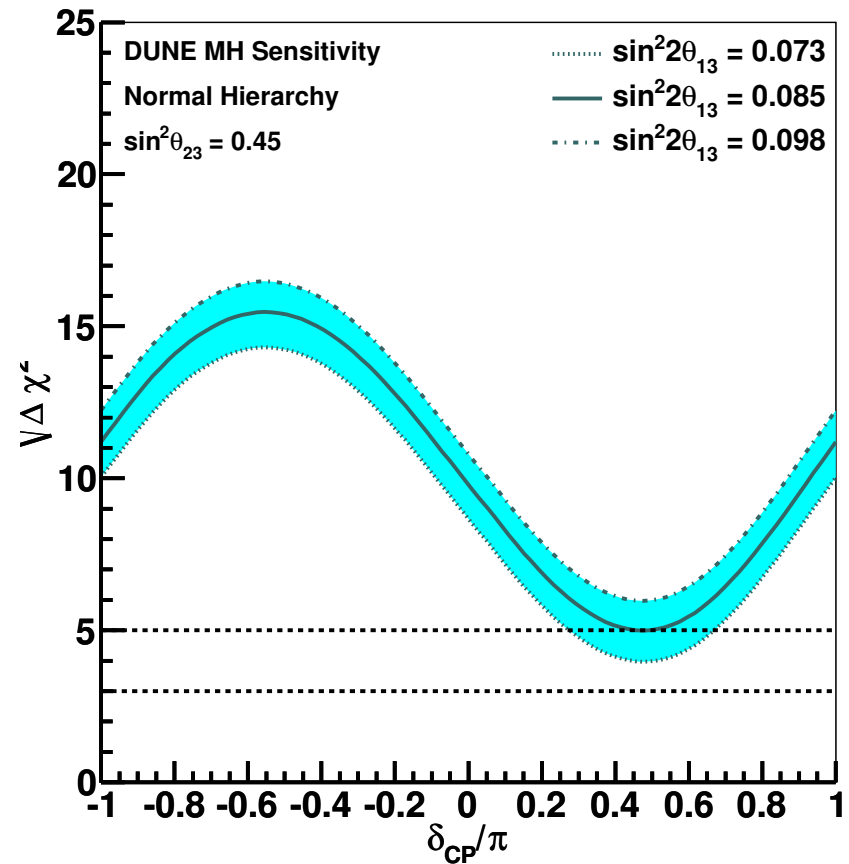
890 kt-MW years = 3 σ for 75% of δ_{CP} values

Parameter Variations: MH

Mass Hierarchy Sensitivity

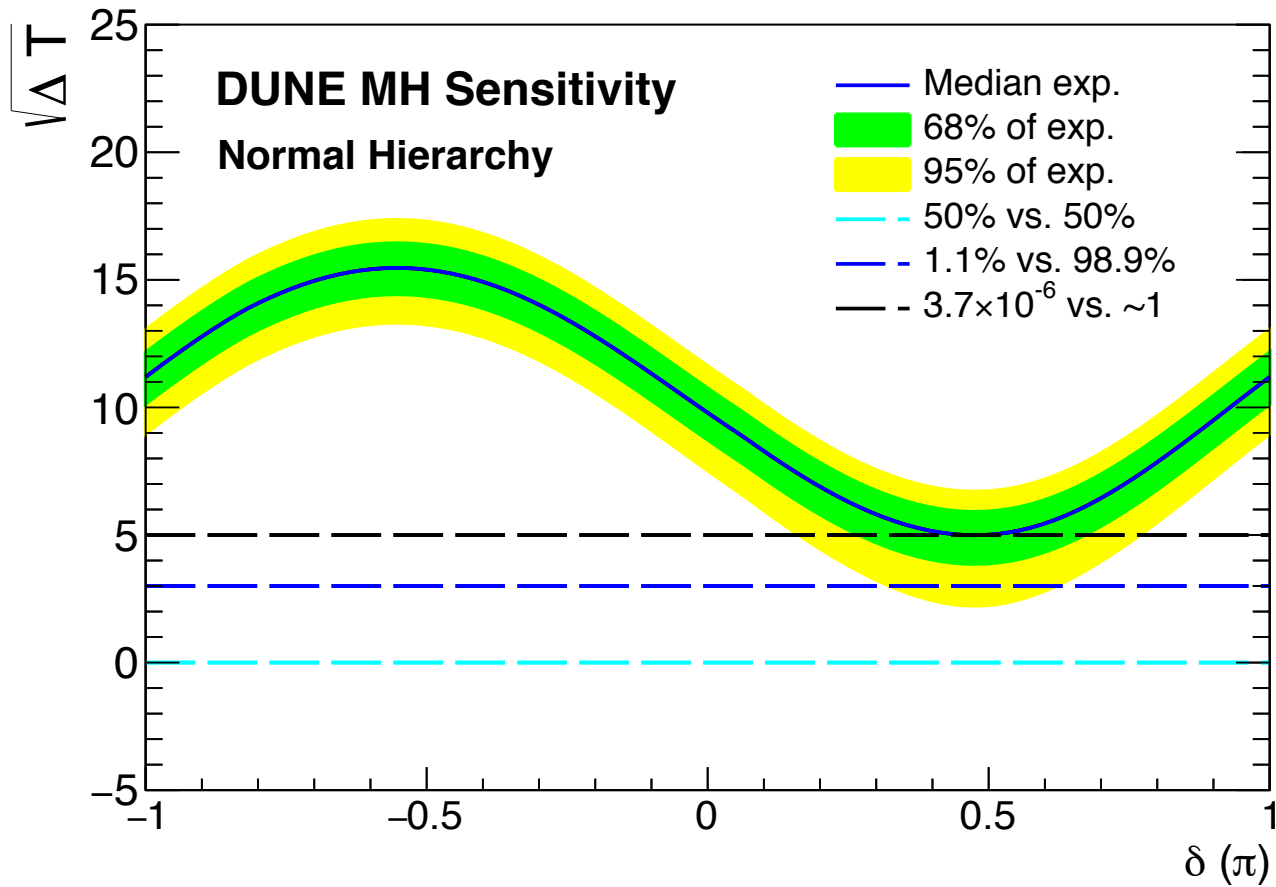


Mass Hierarchy Sensitivity



230 kt-MW years = 5σ for 100% of δ_{CP} values

MH Stats



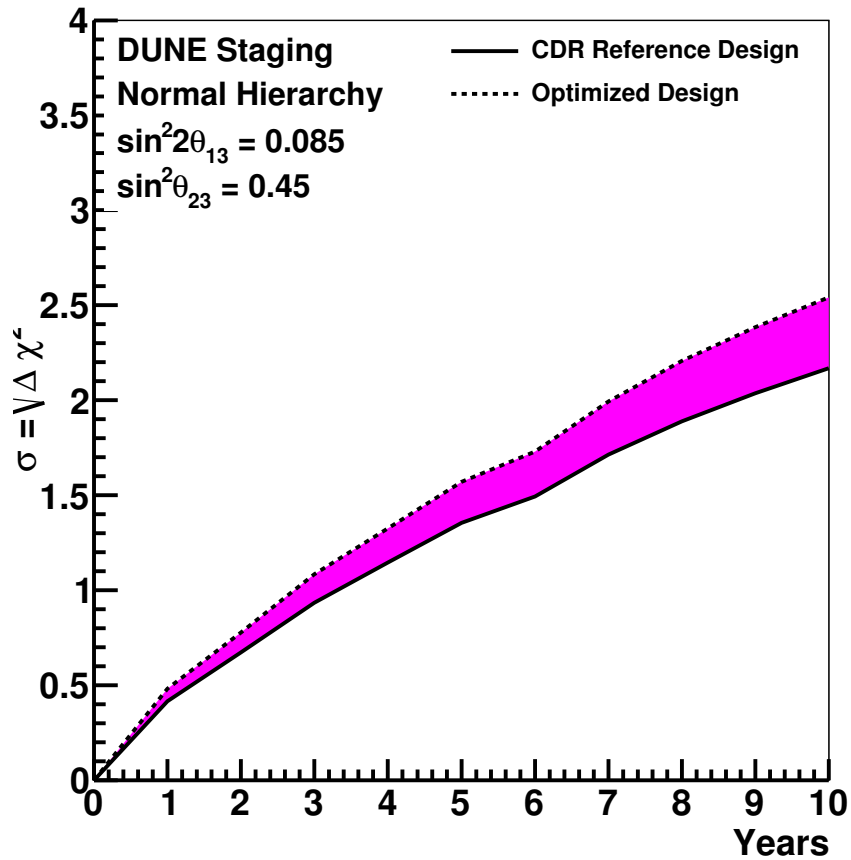
230 kt-MW years = 5σ for 100% of δ_{CP} values

Staging Plan

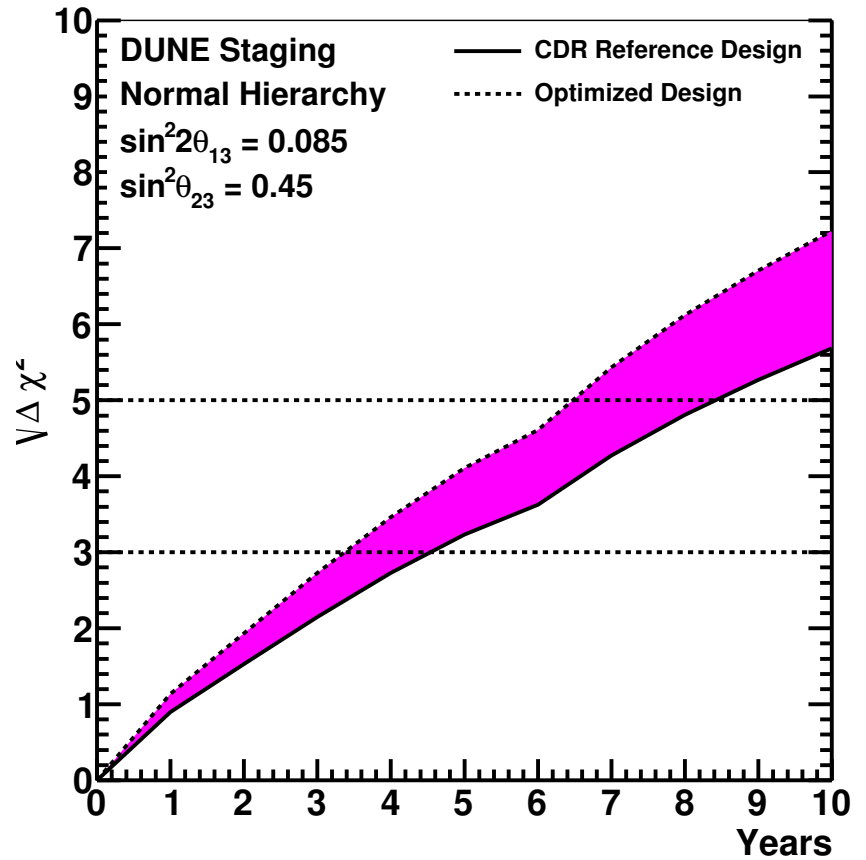
- Very Preliminary!
- Includes staging of FD mass, ND installation, and beam power
- Does not include upgrades to focusing
- Year 1: 10 kt, no ND
- Year 2: +10 kt, no ND
- Year 3: +10 kt, preliminary ND constraint
- Year 4: +10 kt
- Year 5: Full ND constraint
- Year 7: Upgrade power to 2.14 MW

Staging Plan

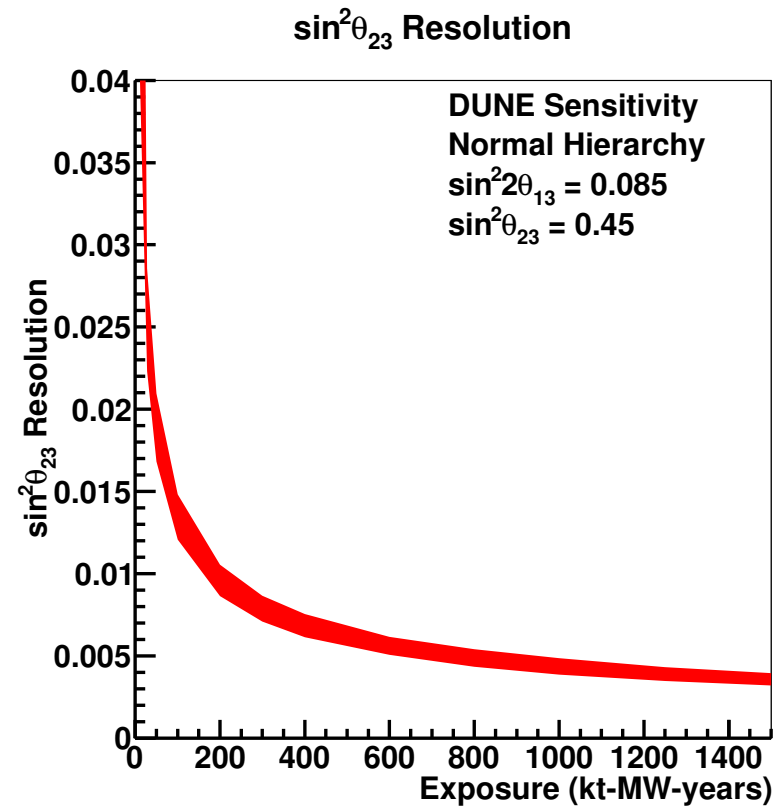
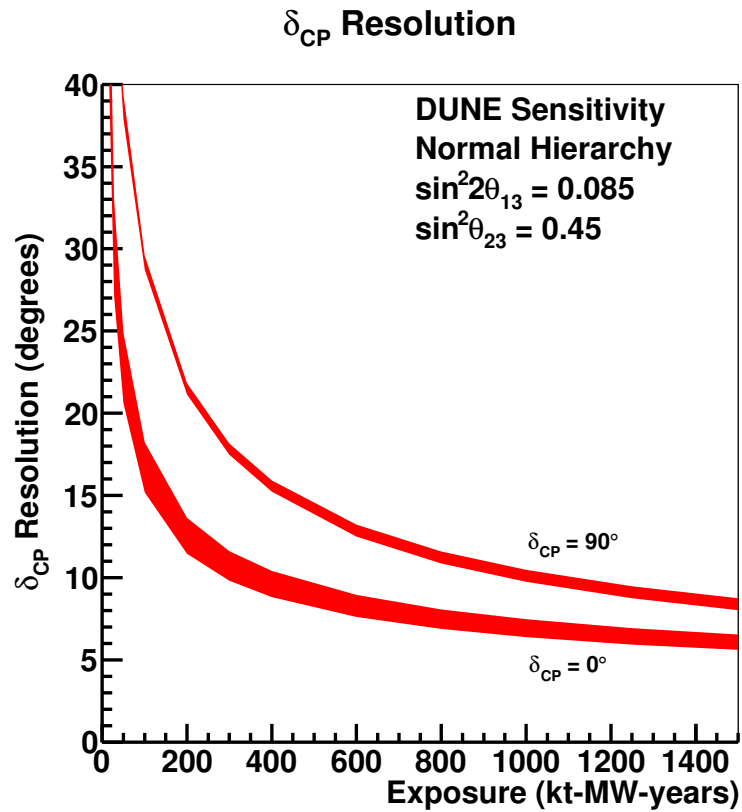
75% CP Violation Sensitivity



100% MH Sensitivity

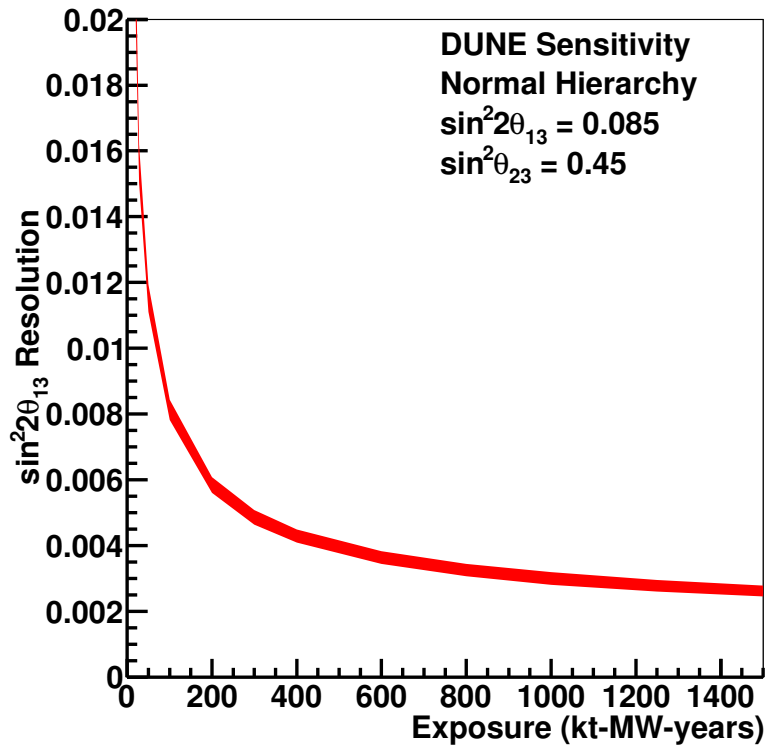


Resolutions

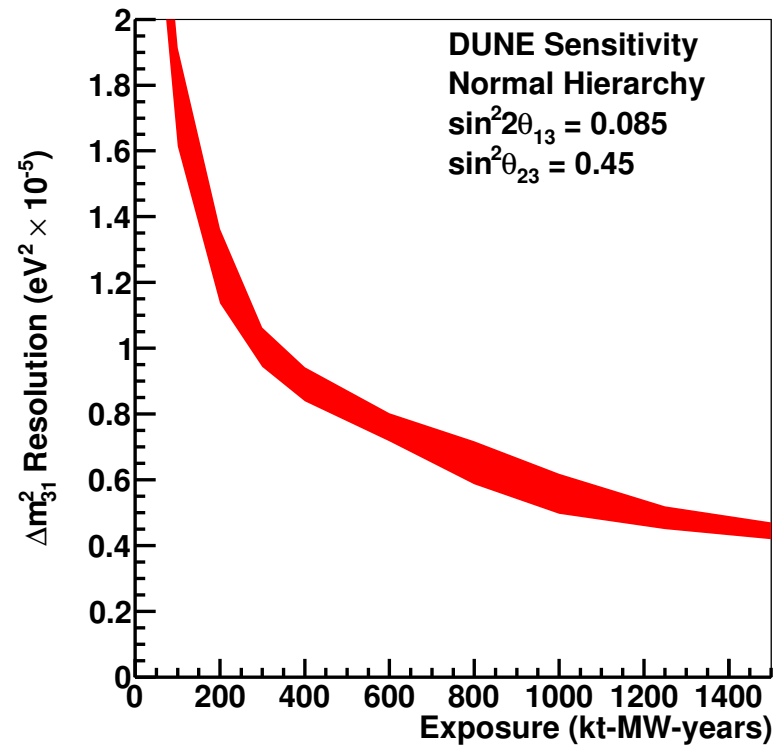


Resolutions (cont)

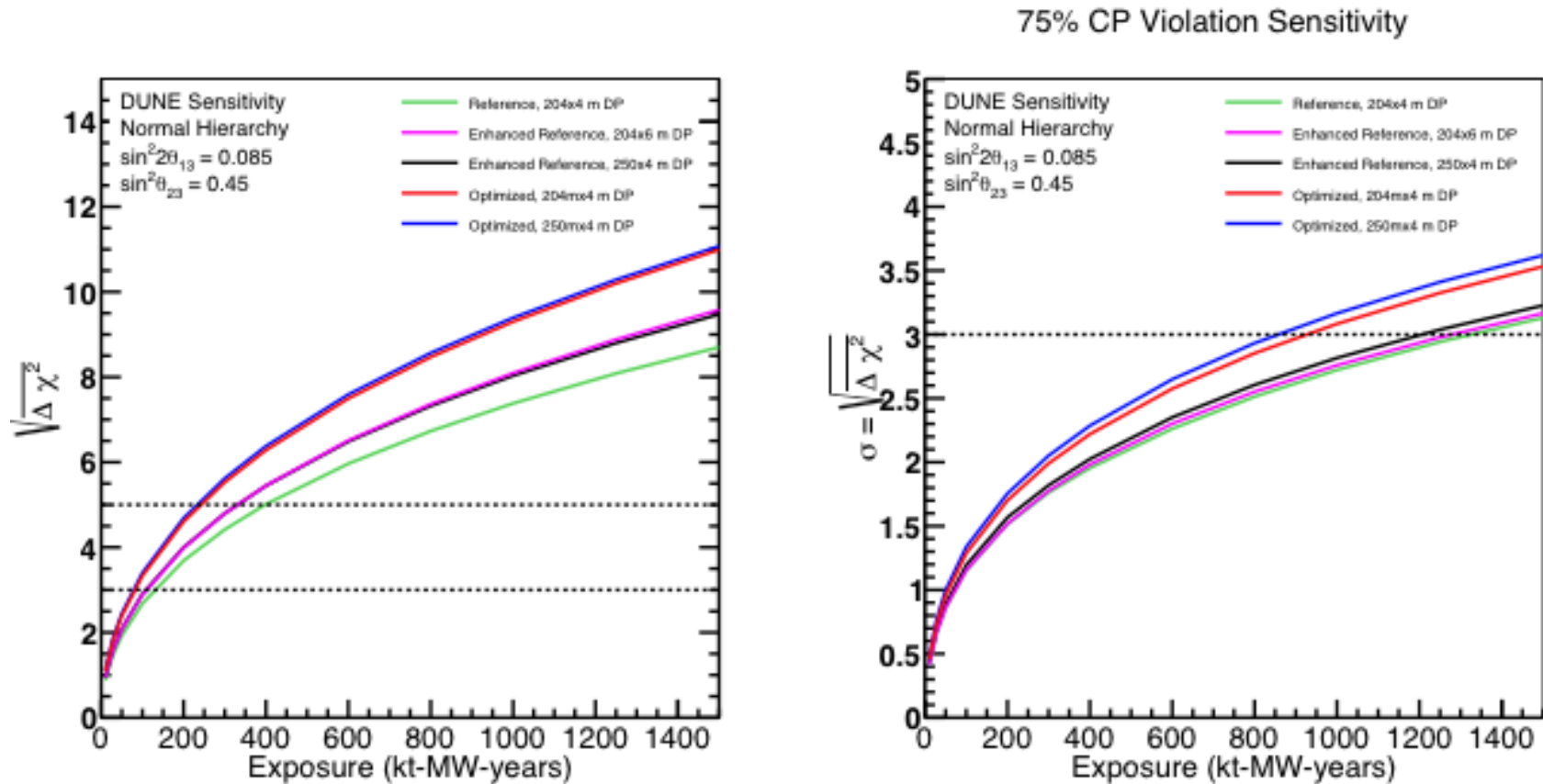
$\sin^2 2\theta_{13}$ Resolution



Δm_{31}^2 Resolution

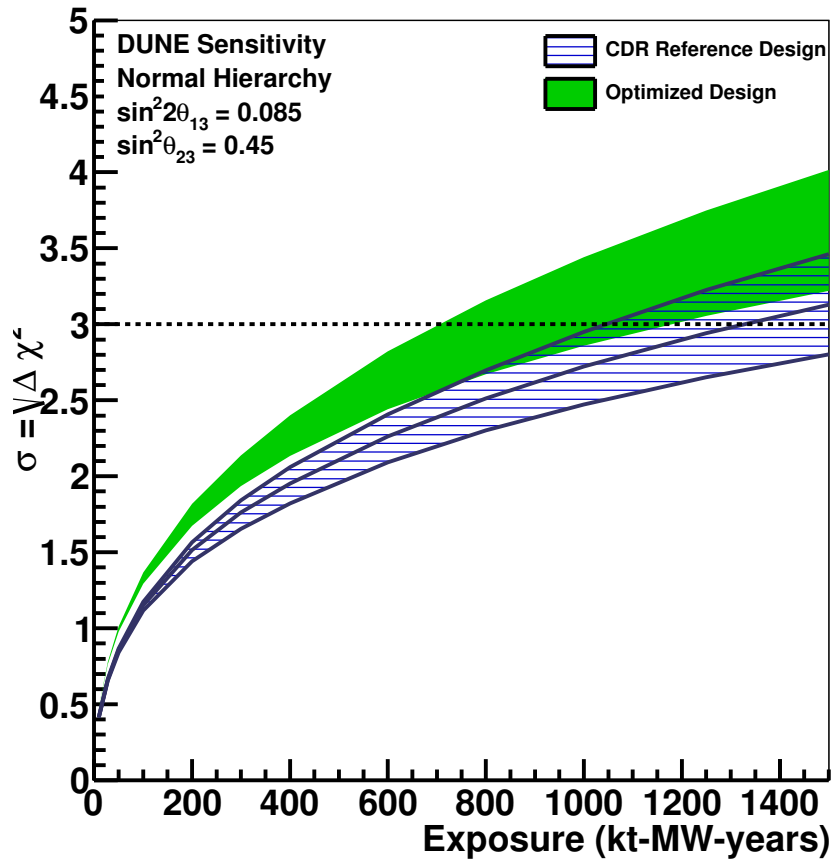


Beam Variations

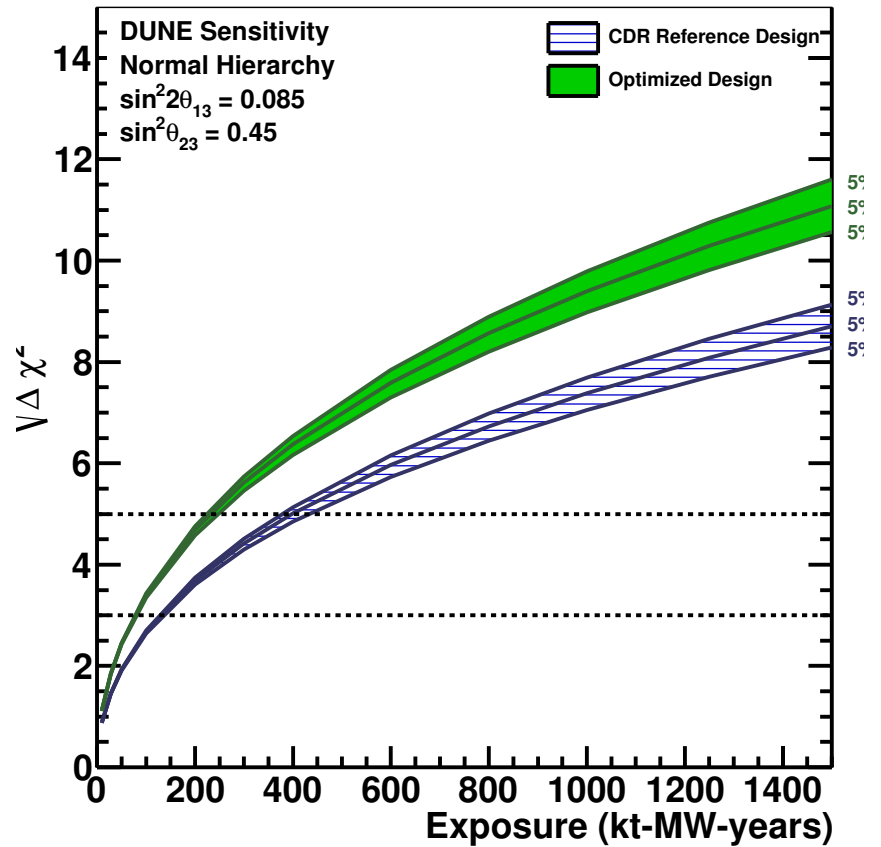


Systematics

75% CP Violation Sensitivity

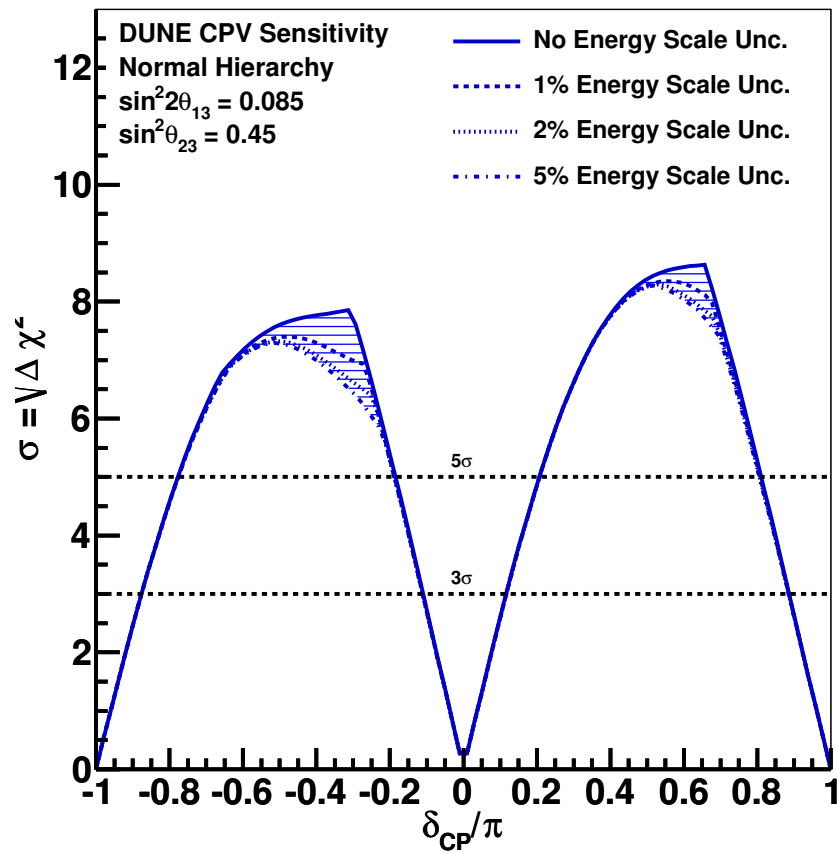


100% MH Sensitivity



Energy Scale Systematics

CP Violation Sensitivity



Mass Hierarchy Sensitivity

