

Sensitivities and Duty Cycles for some Fluxes

Some Sensitivity plots from

Enrique Fernandez-Martinez

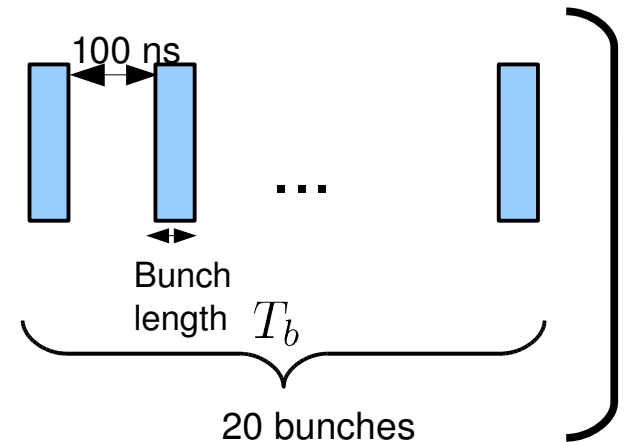
Atmospheric Background Simulation

- A simulation of the atmospheric background of muon neutrinos was made
- A directional cut on the atmospheric background was made in the beam direction with the angle $(E(\text{GeV}))^{-1/2}$
- Remaining background events were multiplied with different Suppression Factors (SF) to achieve sensitivity plots of θ_{13} and δ_{cp} and $\text{sign}(\Delta m_{23}^2)$

The Detector's The DR's
Suppression Factor (SF) = Duty Cycle (DC)

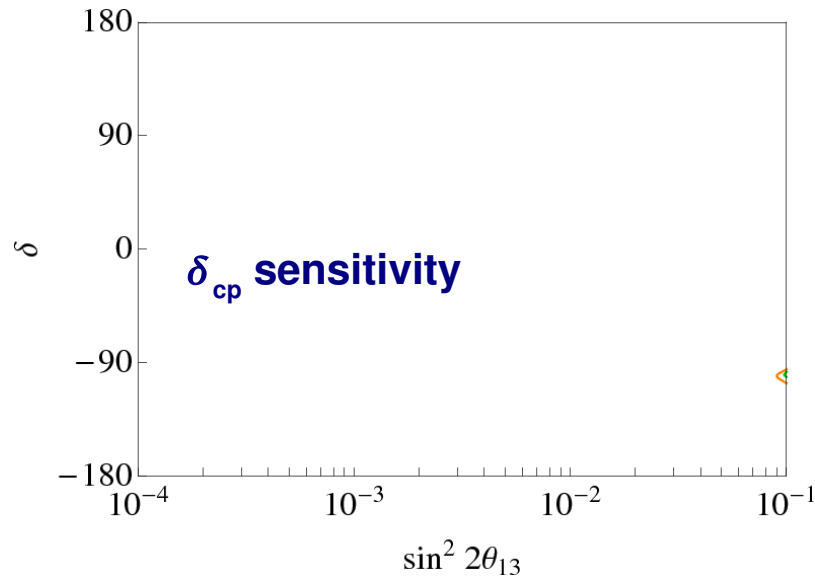
- Assuming $DC = 20T_b/T_{rev}$
- With $T_b = 5.2 \text{ ns}$ (for both ${}^6\text{He}$ and ${}^{18}\text{Ne}$)
the DC for FP6 is 0.45%

Steven Hancock

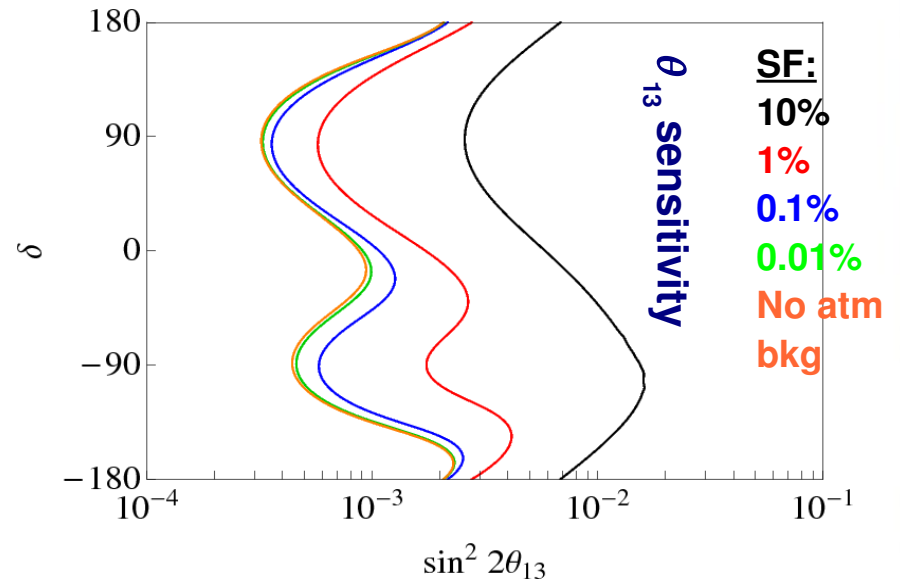
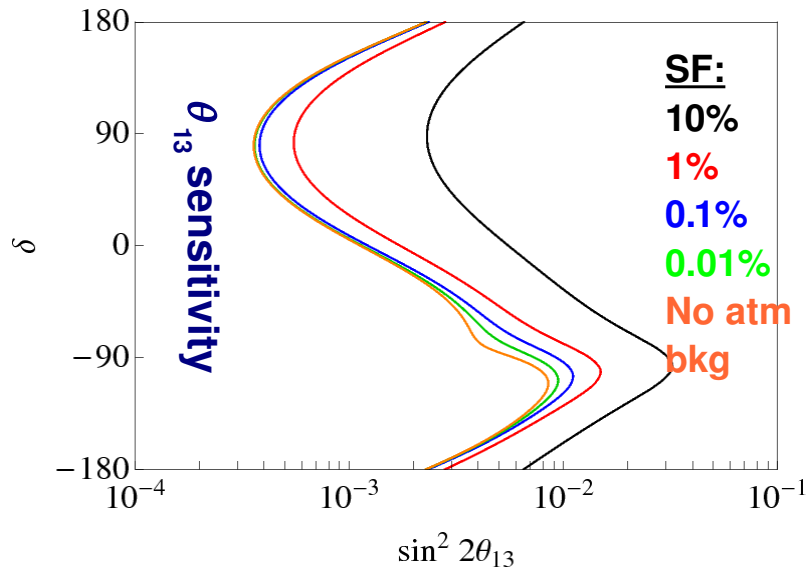
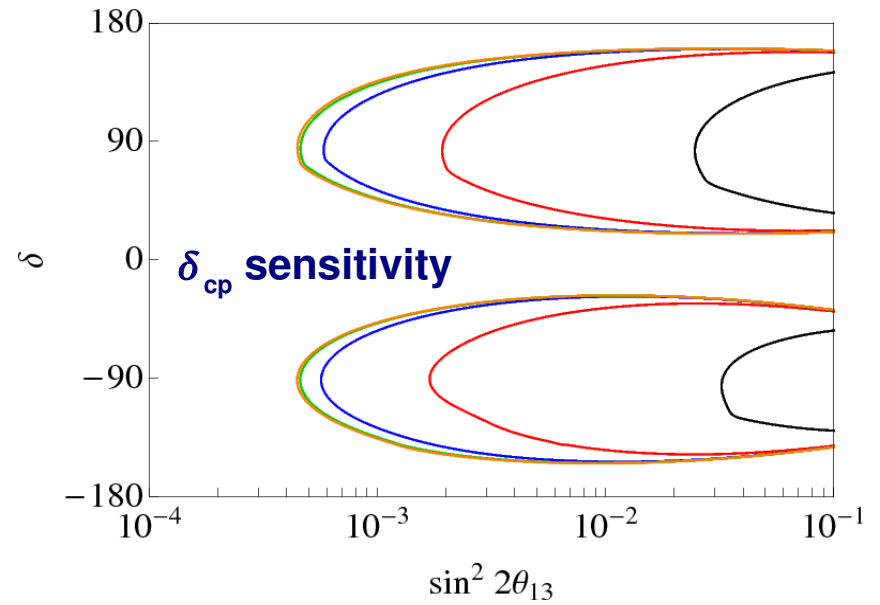


Sensitivities (FP6)

Achieved Fluxes: He/Ne 3.1e18/4.6e16



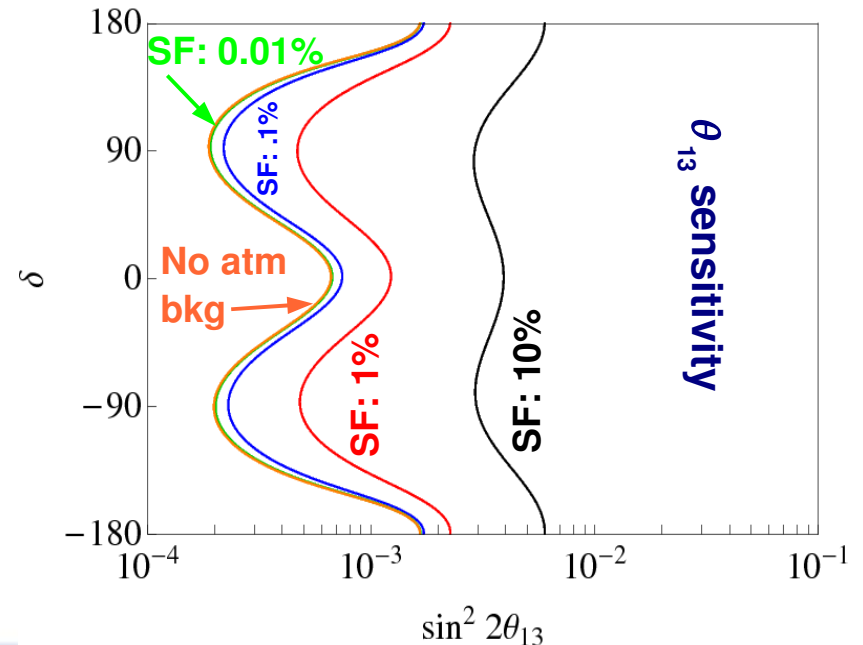
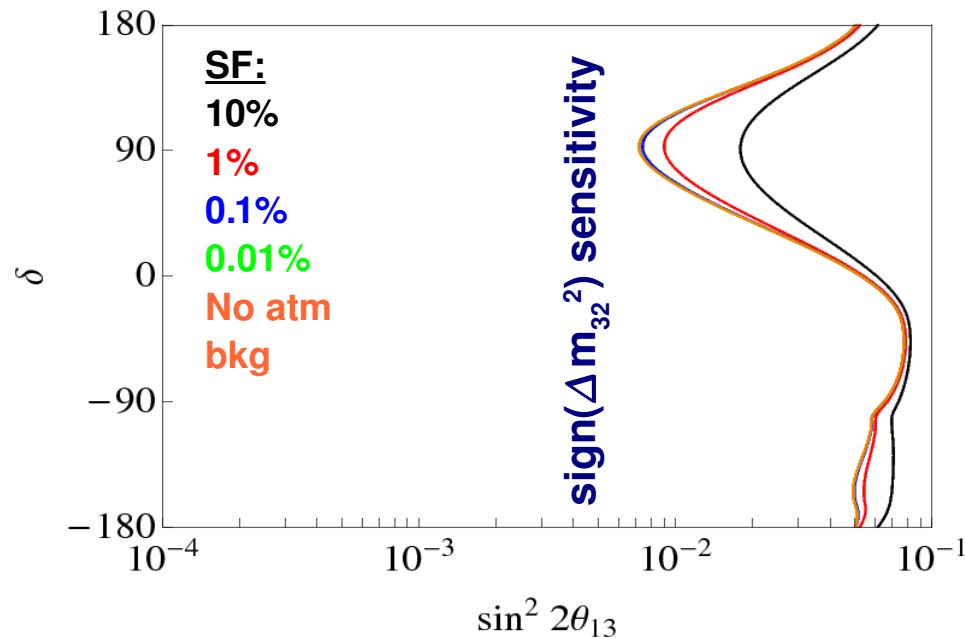
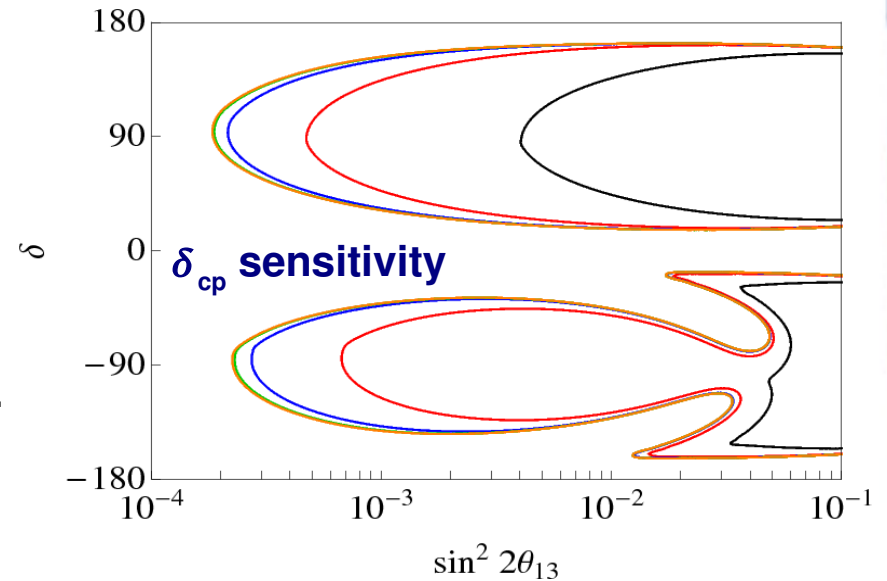
Aimed Fluxes: He/Ne 2.9e18/1.1e18



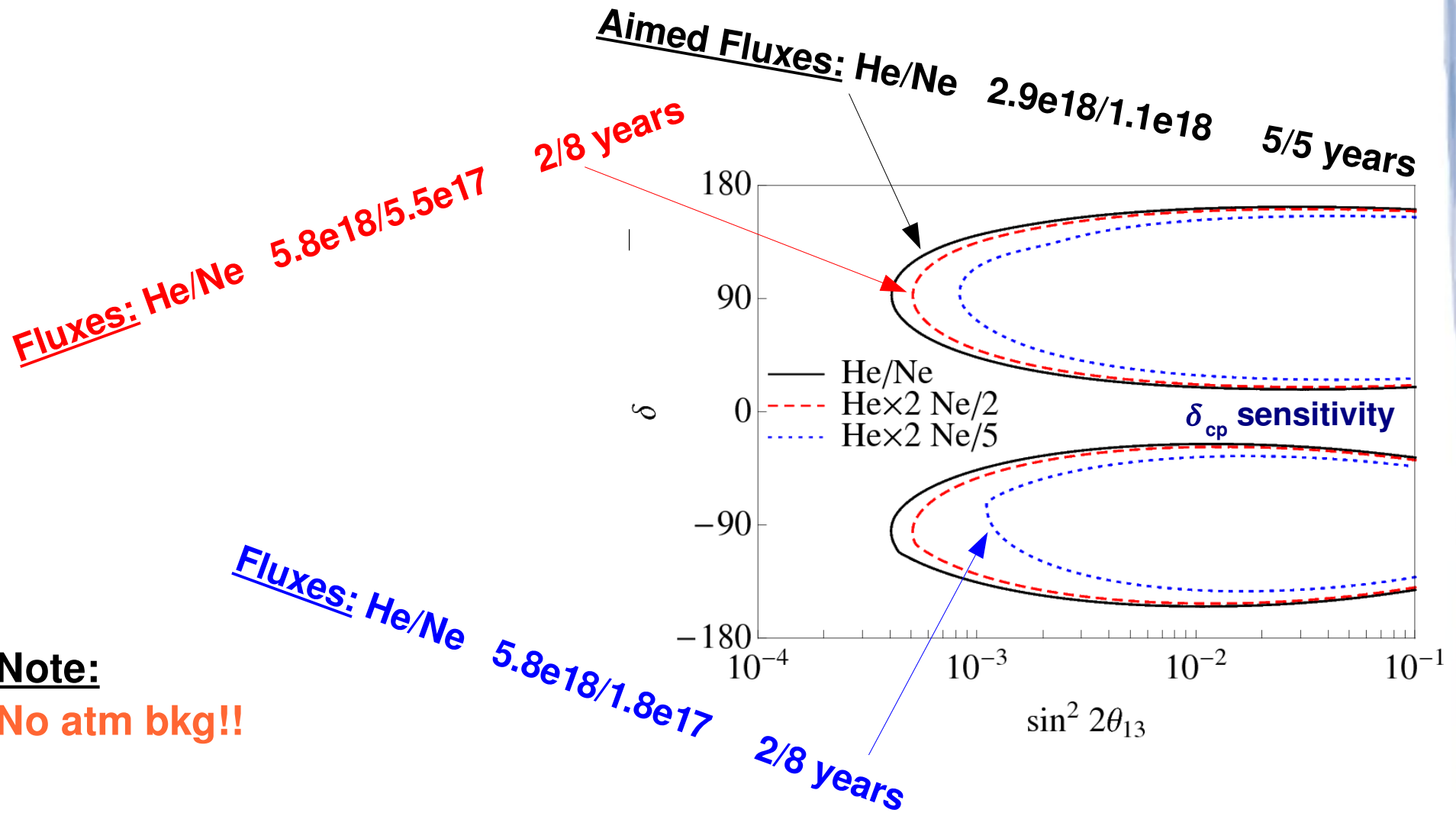
FP7: Optimistic Flux

- If we assume
 - Rubbia's production ring works
 - Same merging factors as FP6
 - No charge limits in PS & SPS
- We get annual ν fluxes $8.04 \cdot 10^{18}$ for ${}^8\text{B}$ and $1.45 \cdot 10^{19}$ for ${}^8\text{Li}$

Optimistic FP7 Fluxes: Li/B 1.45e19/8.04e18



FP6: 2 years ${}^6\text{He}$ & 8 years ${}^{18}\text{Ne}$



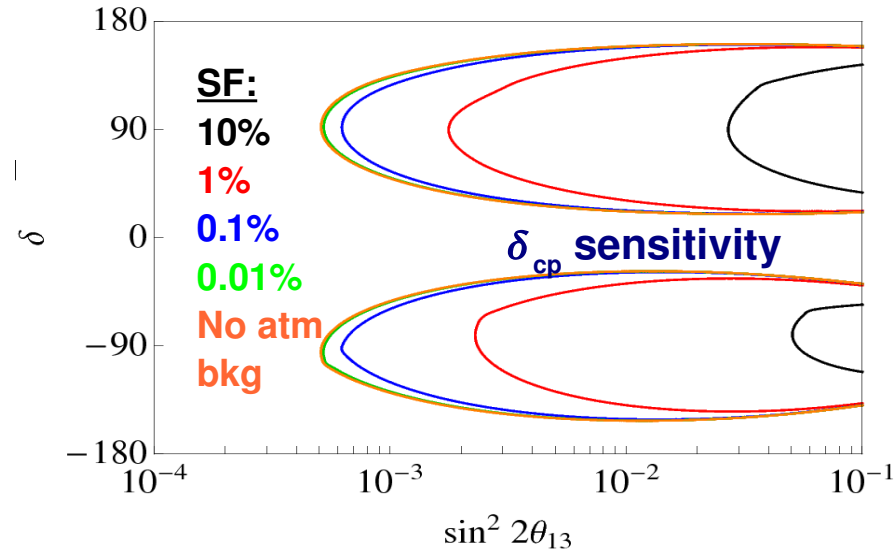
Remember: Achieved Fluxes: He/Ne $3.1\text{e}18/4.6\text{e}16$

FP6: 2 years ${}^6\text{He}$ & 8 years ${}^{18}\text{Ne}$

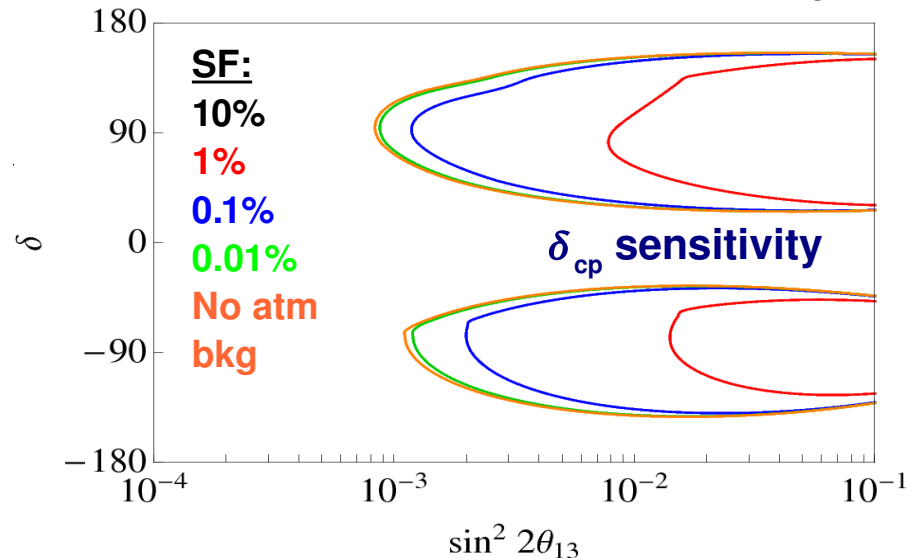
Due to very low ${}^{18}\text{Ne}$ flux background gets more substantial \rightarrow

In the ${}^{18}\text{Ne}/5$ case a $\text{SF} < 0.1\%$ is needed

Fluxes: He/Ne 5.8e18/5.5e17 2/8 years



Fluxes: He/Ne 5.8e18/1.8e17 2/8 years



Remember: Achieved Fluxes: He/Ne 3.1e18/4.6e16

FP7: ${}^8\text{B}$ & ${}^8\text{Li}$ (5 & 5 years)

Note:

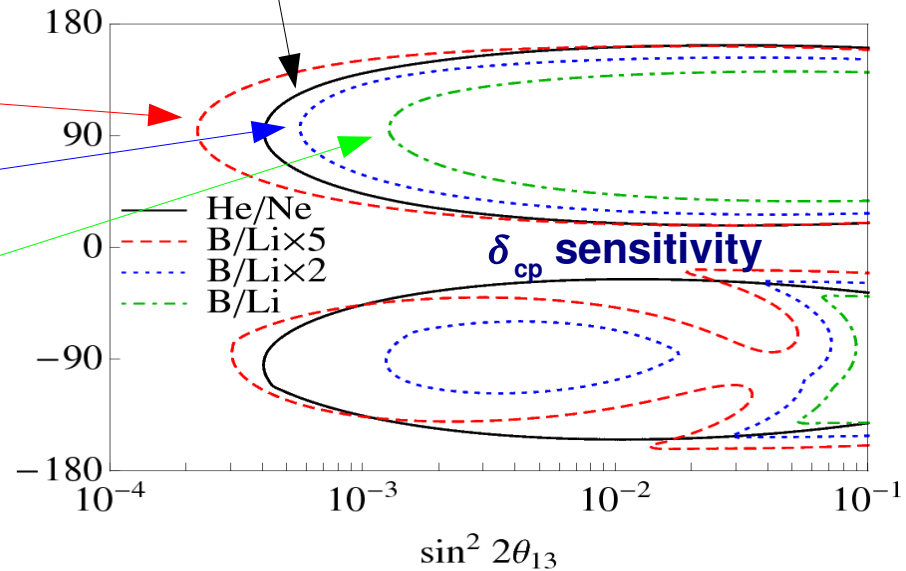
No atm bkg!!

Fluxes: Li/B 1.5e19/5.5e18

Fluxes: Li/B 5.8e18/2.2e18

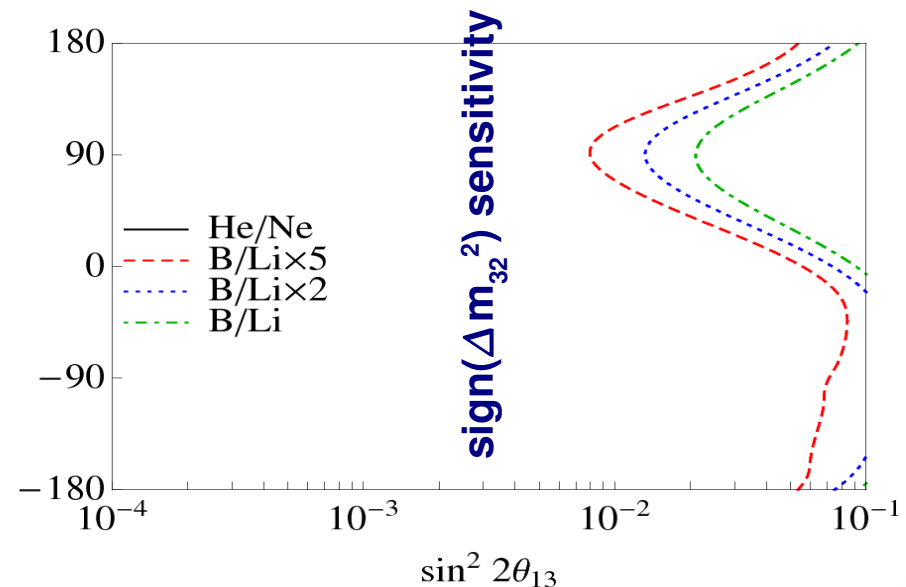
Fluxes: Li/B 2.9e18/1.1e18

Aimed Fluxes: He/Ne 2.9e18/1.1e18



High Li/B flux needed to be competitive with He/Ne for δ_{cp}

But for $\text{sign}(\Delta m_{32}^2)$ Li/B much better (He/Ne not even showing on plot)



FP7: ${}^6\text{He}$ & ${}^8\text{B}$ & ${}^8\text{Li}$ (2 & 3 & 5 years)

Note:

No atm bkg!!

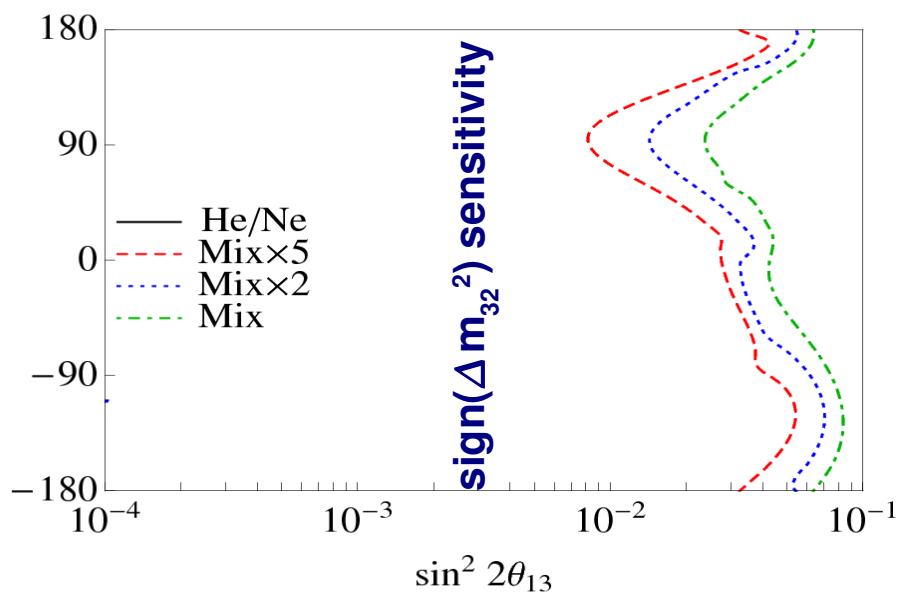
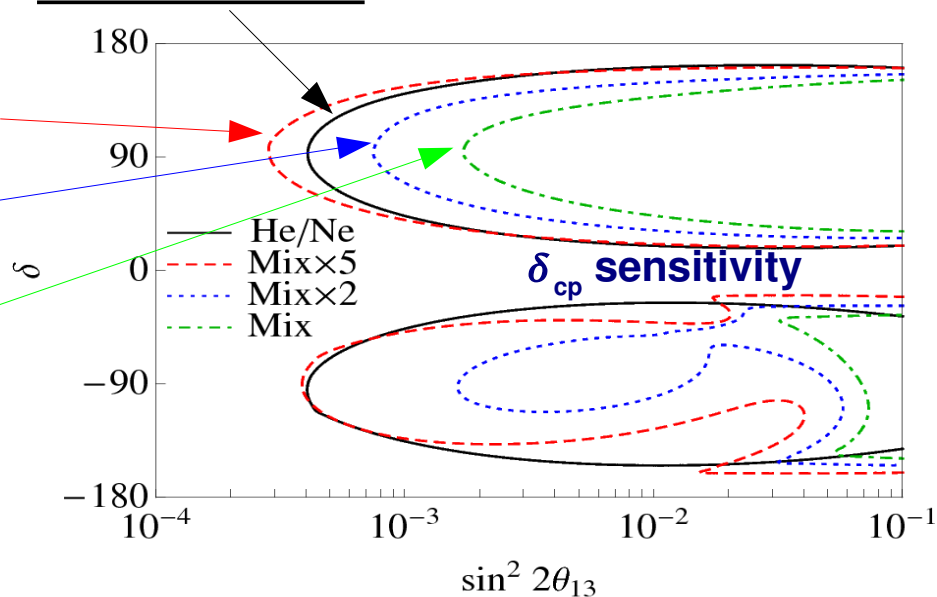
Fluxes: He/Li/B 2.9e18/1.5e19/5.5e18

Fluxes: He/Li/B 2.9e18/5.8e18/2.2e18

Fluxes: He/Li/B 2.9e18/2.9e18/1.1e18

- $\gamma = 100$ for all ions
- One baseline \rightarrow
- ν from ${}^6\text{He}$ detected at second oscillation peak ν_0

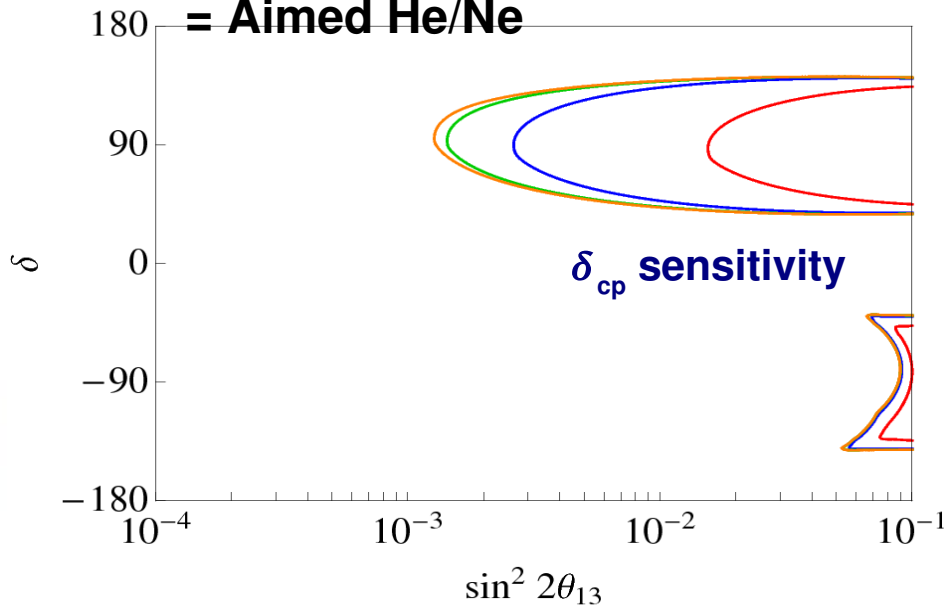
Aimed Fluxes: He/Ne 2.9e18/1.1e18



FP7: ${}^8\text{B}$ & ${}^8\text{Li}$ (5 & 5 years)

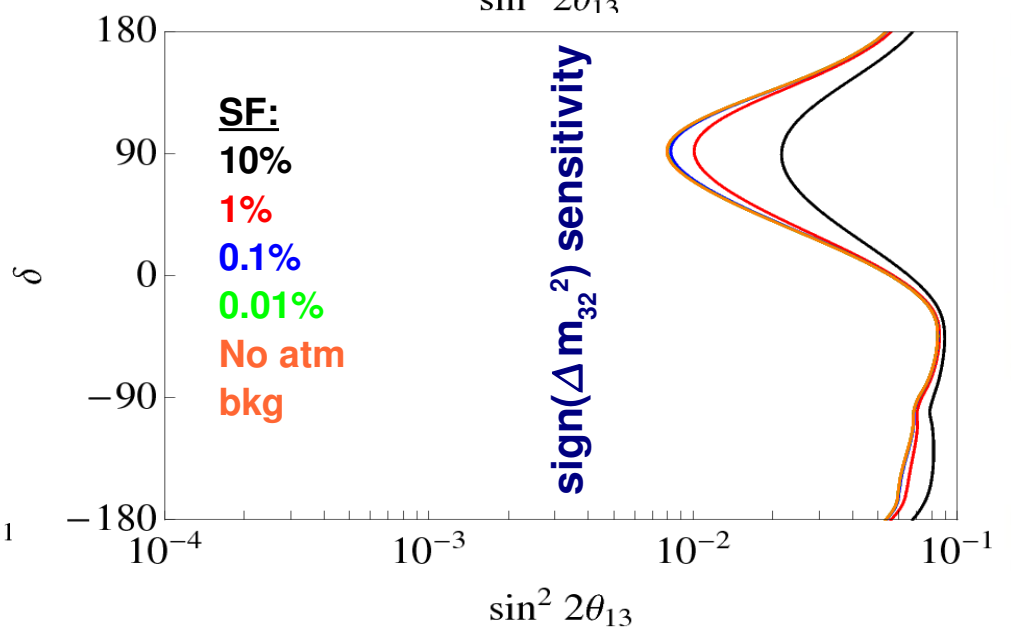
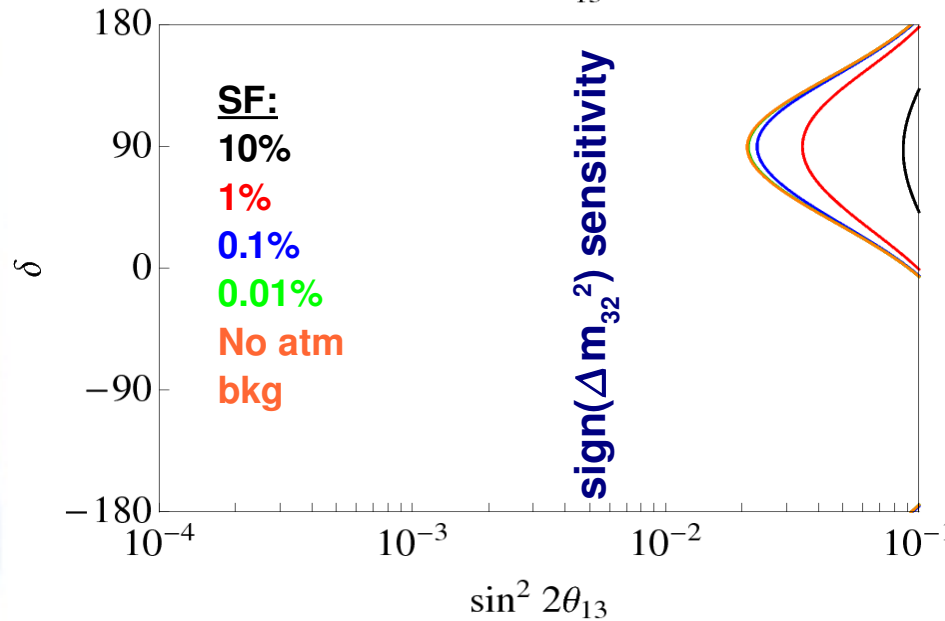
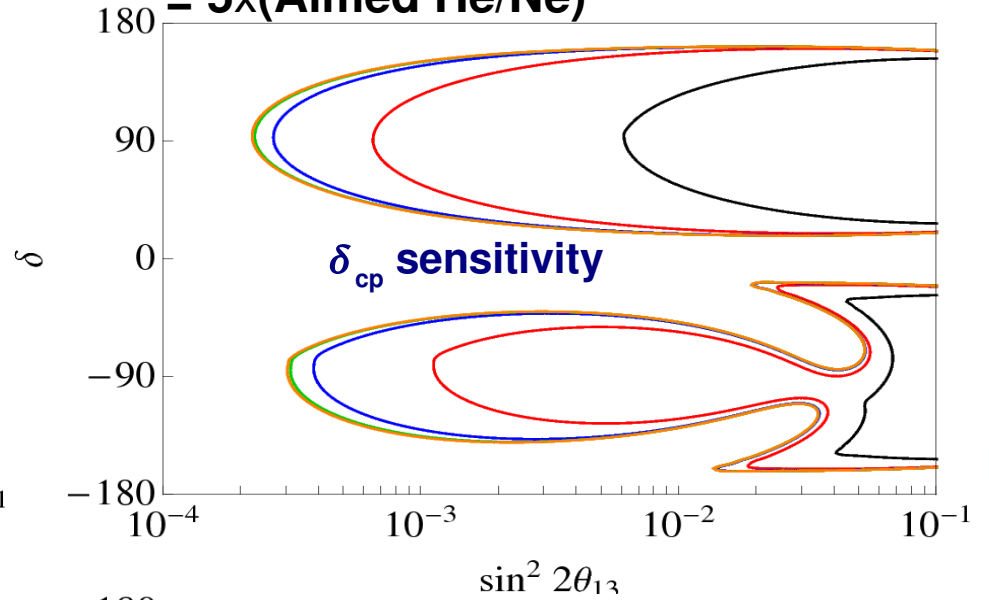
Assumed Fluxes: Li/B 2.9e18/1.1e18

= Aimed He/Ne



Assumed Fluxes: Li/B 1.5e19/5.5e18

= 5x(Aimed He/Ne)



Remember: Optimistic FP7 Fluxes: Li/B 1.45e19/8.04e18