

HK sensitivity study

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Reminder : introduction

- Simultaneous fit of the appearance and disappearance spectra. (LOI only use appearance)
- Selection cuts are same as T2K ν_e and ν_μ analysis. (Next page)
- Systematic error is same as 2012 T2K analysis. (~10%)
- $\nu:\bar{\nu} = 1e23 \text{ POT} : 3e23 \text{ POT}$ (Same as HKLOI, 7.5MWyr)
- Fitting of 4 oscillation parameters:
 $\delta_{CP}, \theta_{13}, \theta_{23}, \Delta m^2_{32}$, ✘ HKLOI fix $\theta_{23}, \Delta m^2_{32}$
(First check of HK sensitivity for $\theta_{23}, \Delta m^2_{32}$ using beam)

Effect of systematics (δ_{CP} vs. θ_{13} 90C.L.)

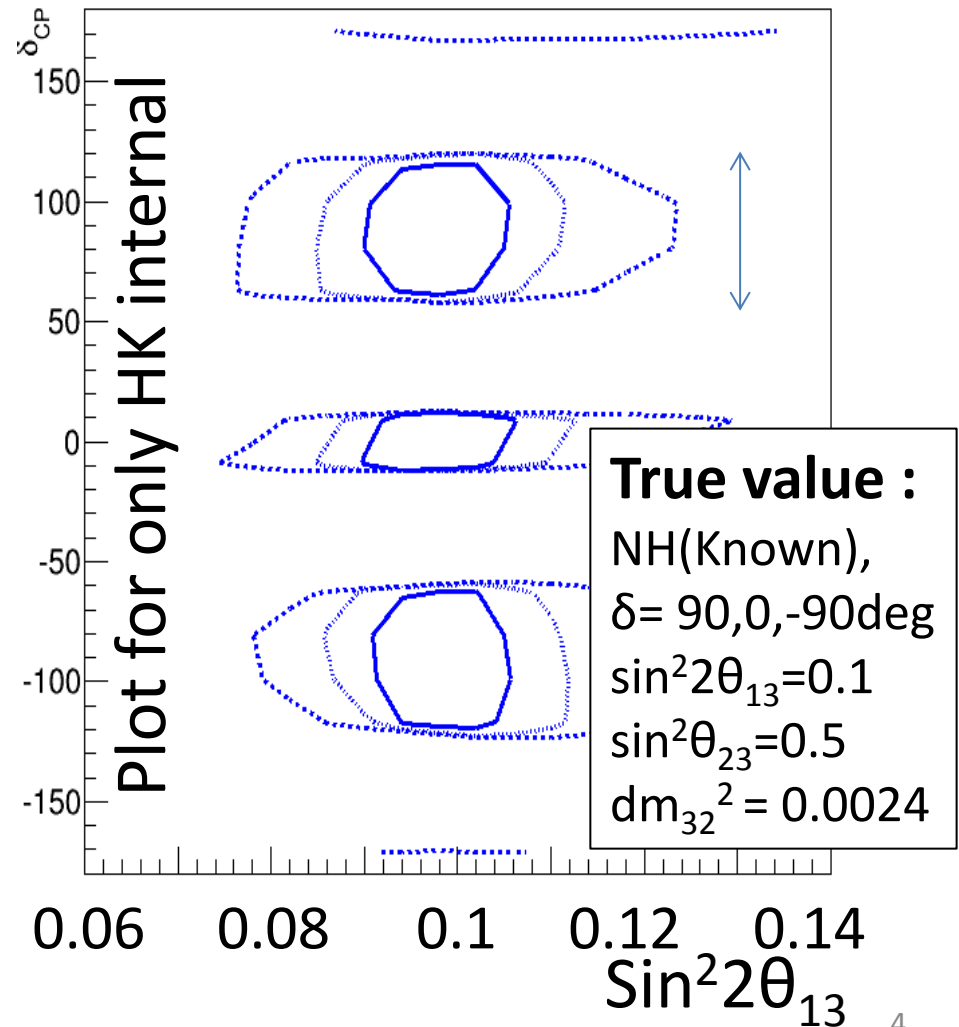
Solid: Stat only
Dash: with T2K sys
Dot: with Half of T2K

The effect of systematics for δ looks too small?

In this case shape error for ν and anti ν is fully correlated.

(additional 10% normalization error for anti ν mode)

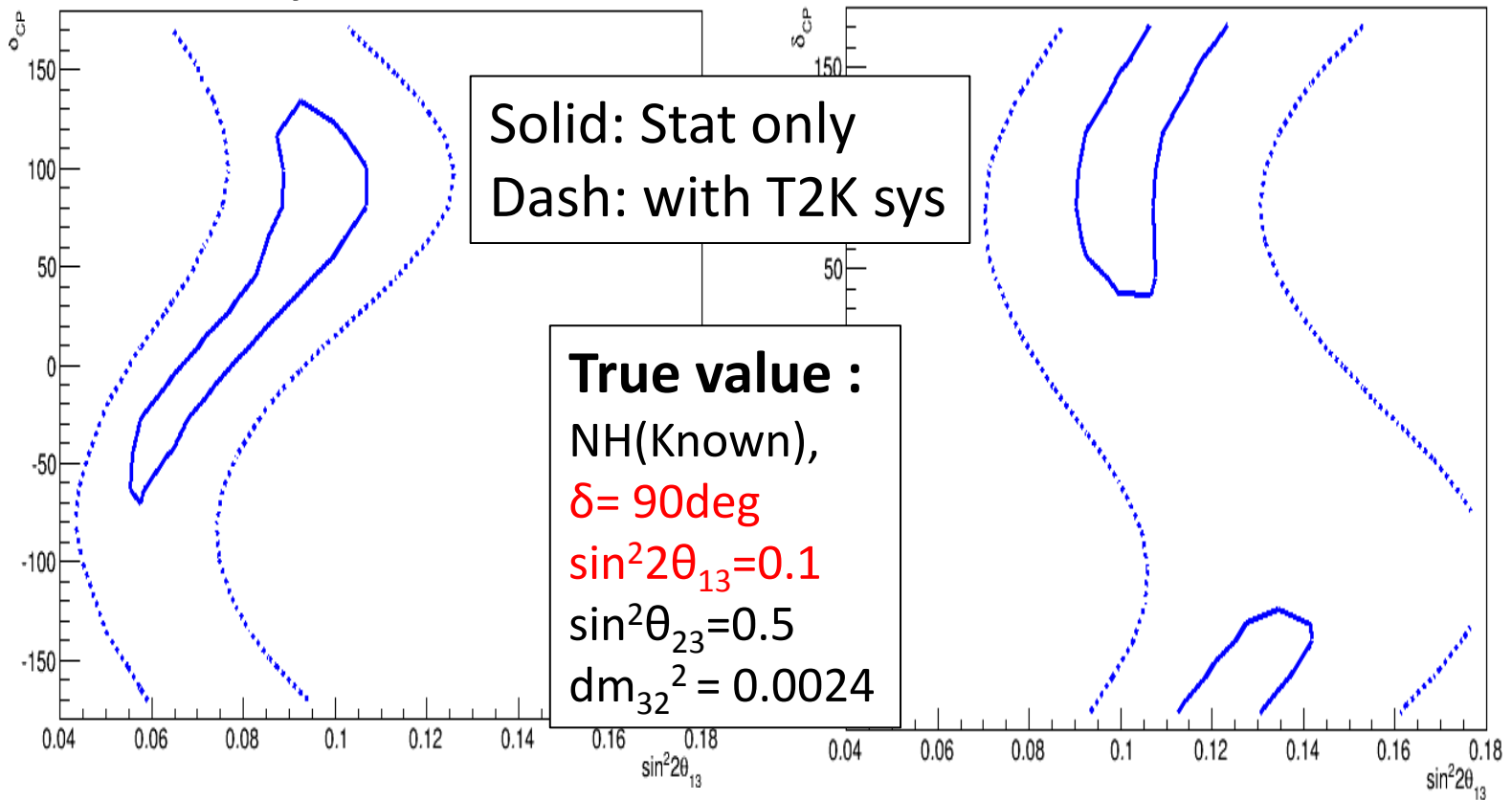
Without reactor



nu mode and anti mode contours

HK only nu mode

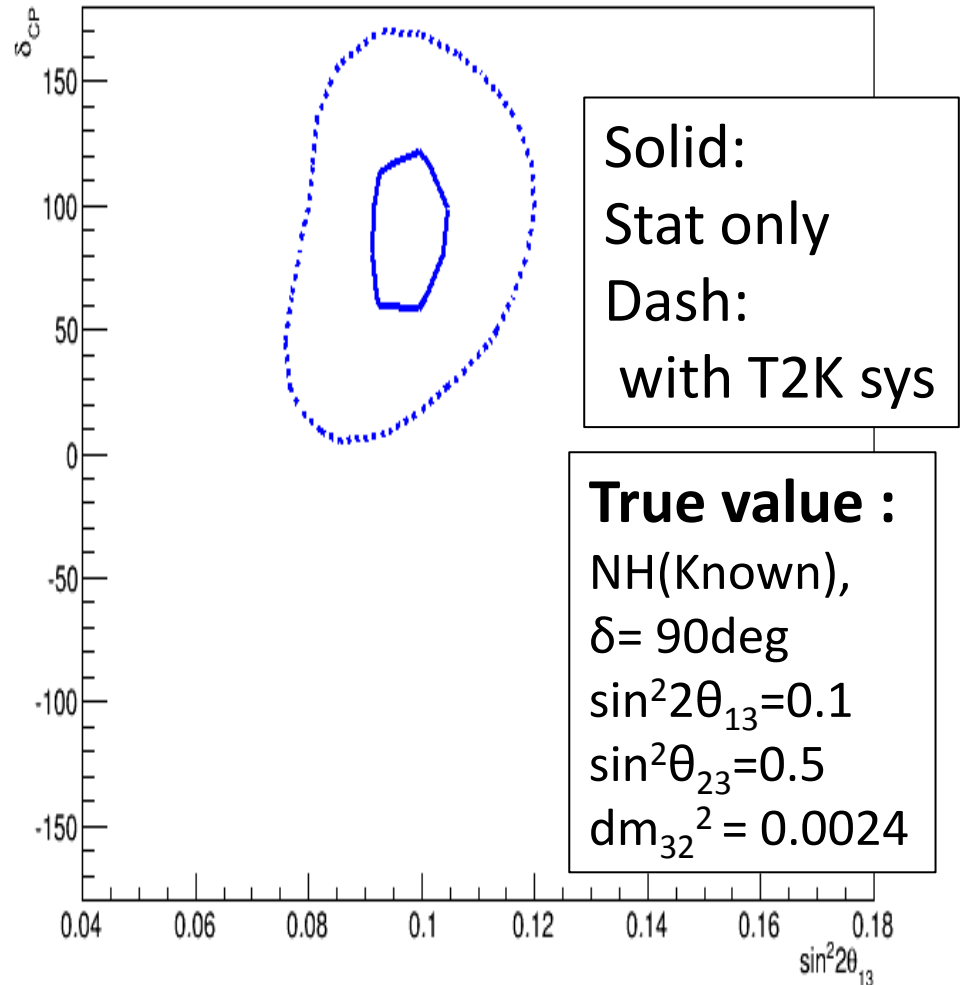
HK only anti mode



Both contours are 90% C.L contours

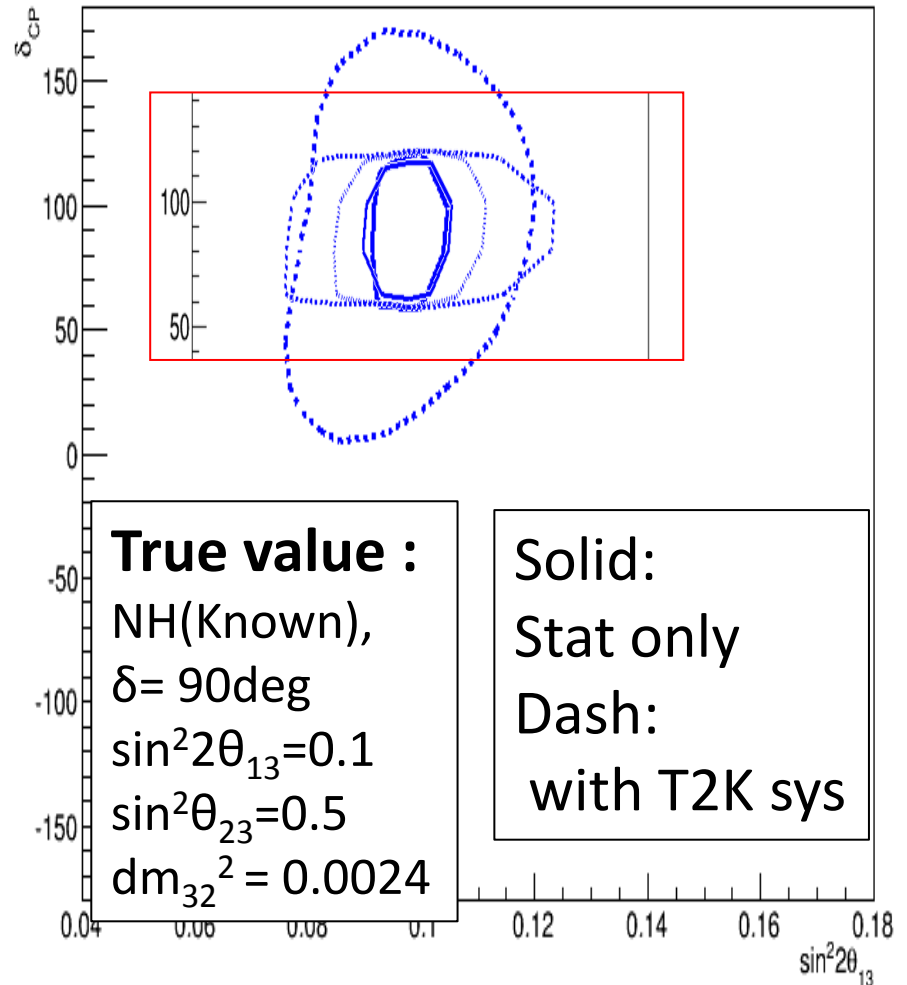
No correlation contour

- Just add 2 contours in previous page to get fully uncorrelated contour.



No correlation contour

- Overlay the correlated contour.
- Looks like correlation between ν mode and anti mode is very important.
- \rightarrow Implementation of new code which have better treatment of ν - anti mode correlation.



To do

- To understand the difference between my contour and Yokoyama san's contour
 - Try the same condition as LOI
- Implement new version of code
 - Better treatment for anti nu mode error
- Develop special covariance for HK.
 - Now I have fitting code with Erec covariance.
 - Use that code with special covariance for HK
 - Need help for what kind of assumption can be done for HK.

Summary

- Study for the effect of systematic error on δ is on going
 - nu mode and anti mode correlation is important.
- To do
 - Try same condition as LOI
 - New code implementation
 - Make special covariance for HK study