

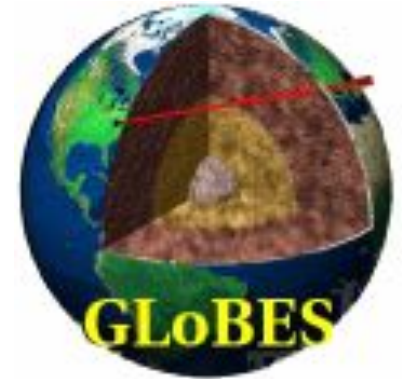
Sensitivity Studies with GLOBES (T2K)

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Introduction to GLoBES

- **General Long Baseline Experiment Simulator.**
- A powerful software to simulate long baseline neutrino experiments and reactor experiments.
- Can be used to study the sensitivity to a range of parameters of various experiments, such as T2K and DUNE...
- Developed in the early 2000s, by Patrick Huber, Joachim Kopp, Manfred Lindner, Mark Rolinec, Walter Winter.
- Contains an **Abstract Experiment Definition Language (AEDL)**, to describe most classes of long baseline experiments.



<http://www.mpi-hd.mpg.de/~globes/>

The Tutorial

- GLoBES tutorial based around the T2K experiment.
- We started with a very basic T2K simulation, and worked on making it more realistic by completing a set of 8 problems.
- The tutorial contains two main parts:

Part I:

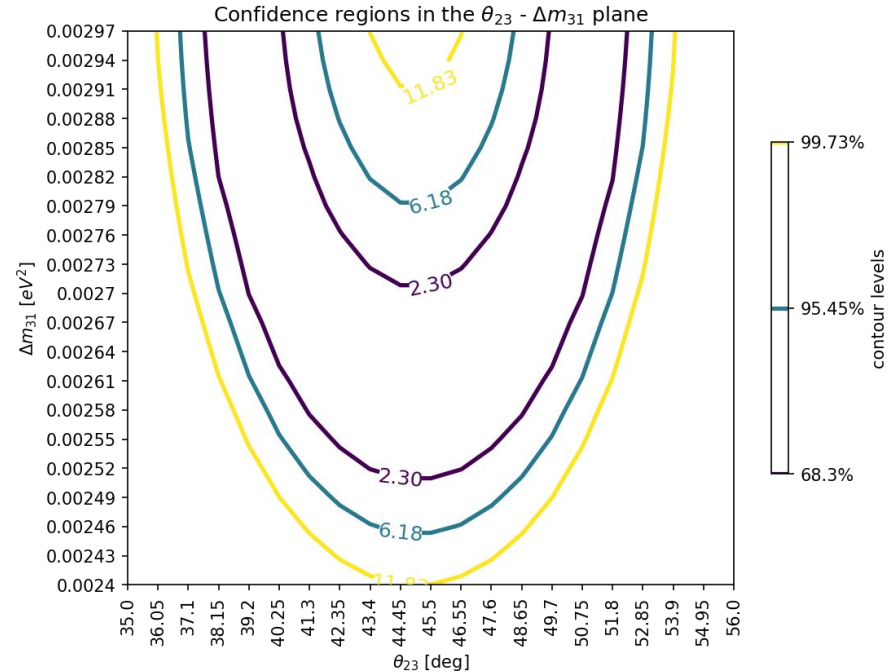
Precision measurement of θ_{23} and Δm_{31}^2 with T2K superbeam experiment, and the systematics that impact the contours.

Part II:

Generic three-flavor effects: sensitivity to θ_{13} and δ_{CP} .

Problem 1: Initial Status

- We were first presented with a simplified simulation (2 years neutrino beam flux + oscillation parameters from **hep-ph/0405172v5**).
- There were three large problems with this code:
 1. Doesn't consider spectral info - Strong Correlation between θ_{23} and Δm_{31}^2 .
 2. Have assumed full knowledge of all other parameters.
 3. Does not consider solutions with - Δm_{31}^2



Problem 2: Spectral Analysis vs Total Rates

- This aimed to deal with the the θ_{23} / Δm^2_{31} correlation.
- θ_{23} values that deviate slightly from the 'truth' result in the same count rates if a higher Δm^2_{31} is assumed.
- The degeneracy can be lifted by making the analysis binning finer.

