

Some Comments

NuMI session

Observations

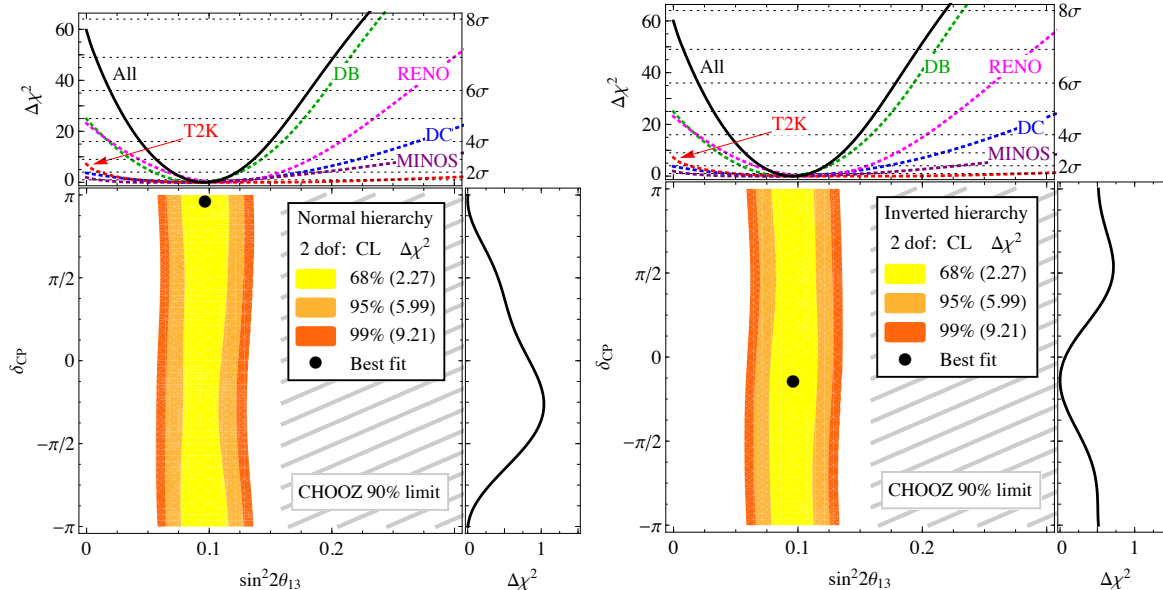
- We will likely know Mass Hierarchy (up to 90%) with a combination of NuMI and T2K within a decade (atmospherics help)
 - After that, arguments for v. long baseline just lead to loss of events and do not help measurement of δ_{CP}
- This is irrespective of what will happen at this meeting, but could be speeded up by it.
- What we are looking at in this meeting is how to measure δ_{CP}

Observations

- NuMI physics reach is significant
 - We do NOT know that NOVA will not be lucky
 - We expected θ_{13} to be tiny, the reality has changed the game
 - We CANNOT be in a situation where we are in the middle of building a huge project and we find we don't need it
 - How well MUST we measure δ_{CP} ?

Independence?

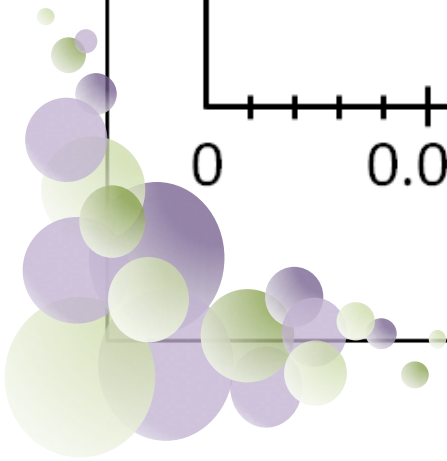
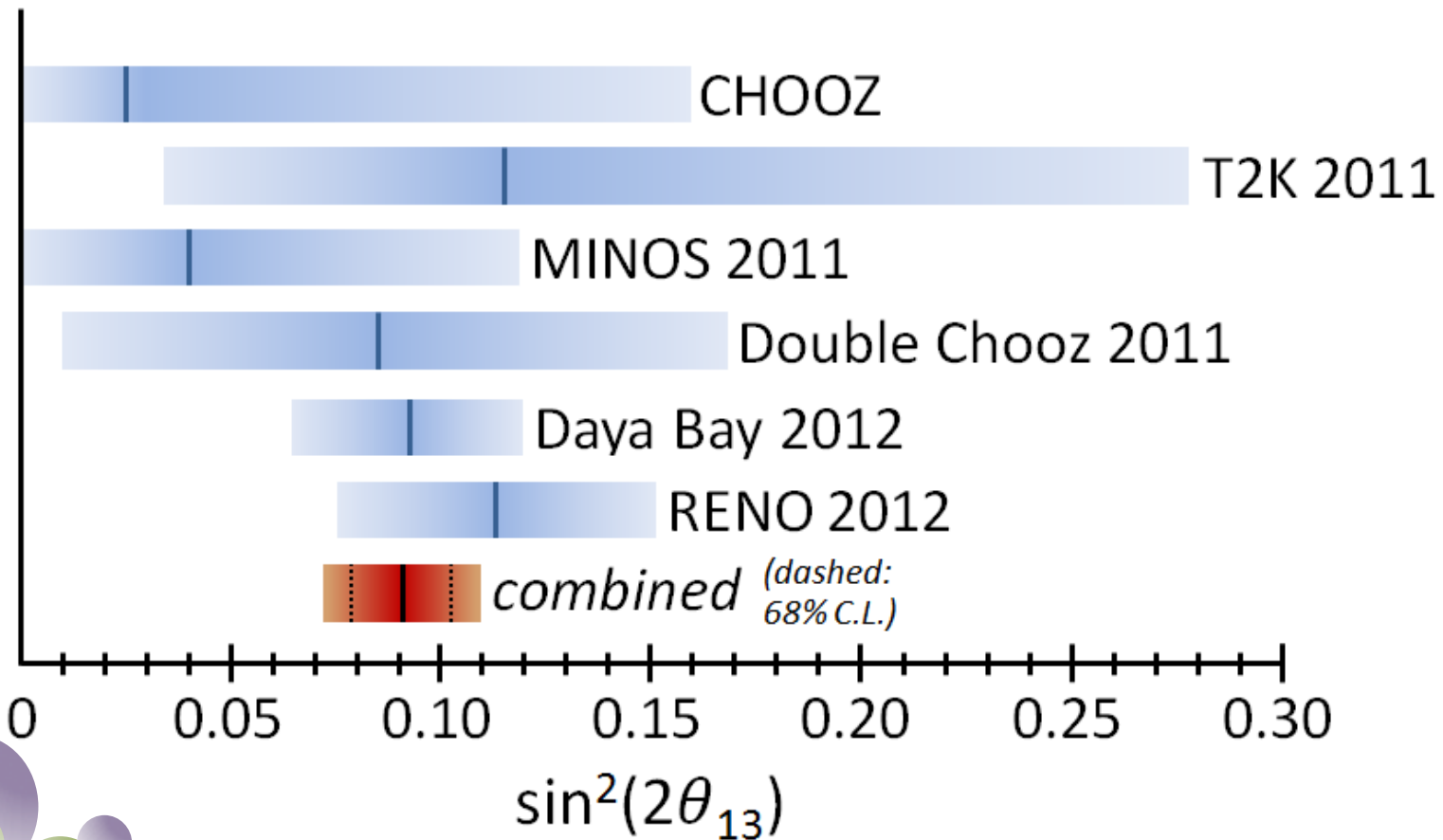
- Do we need to be independent of T2K?
 - If yes, maybe a F2L experiment is what we should be thinking about...but
 - All the experiments in the world are already pitching in to get the answers:



At 1 sigma $0.083 < \sin^2 2\theta_{13} < 0.11$

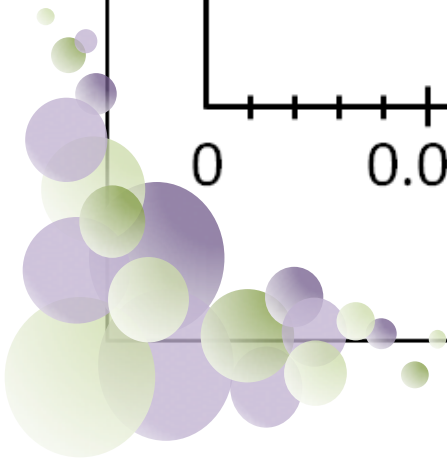
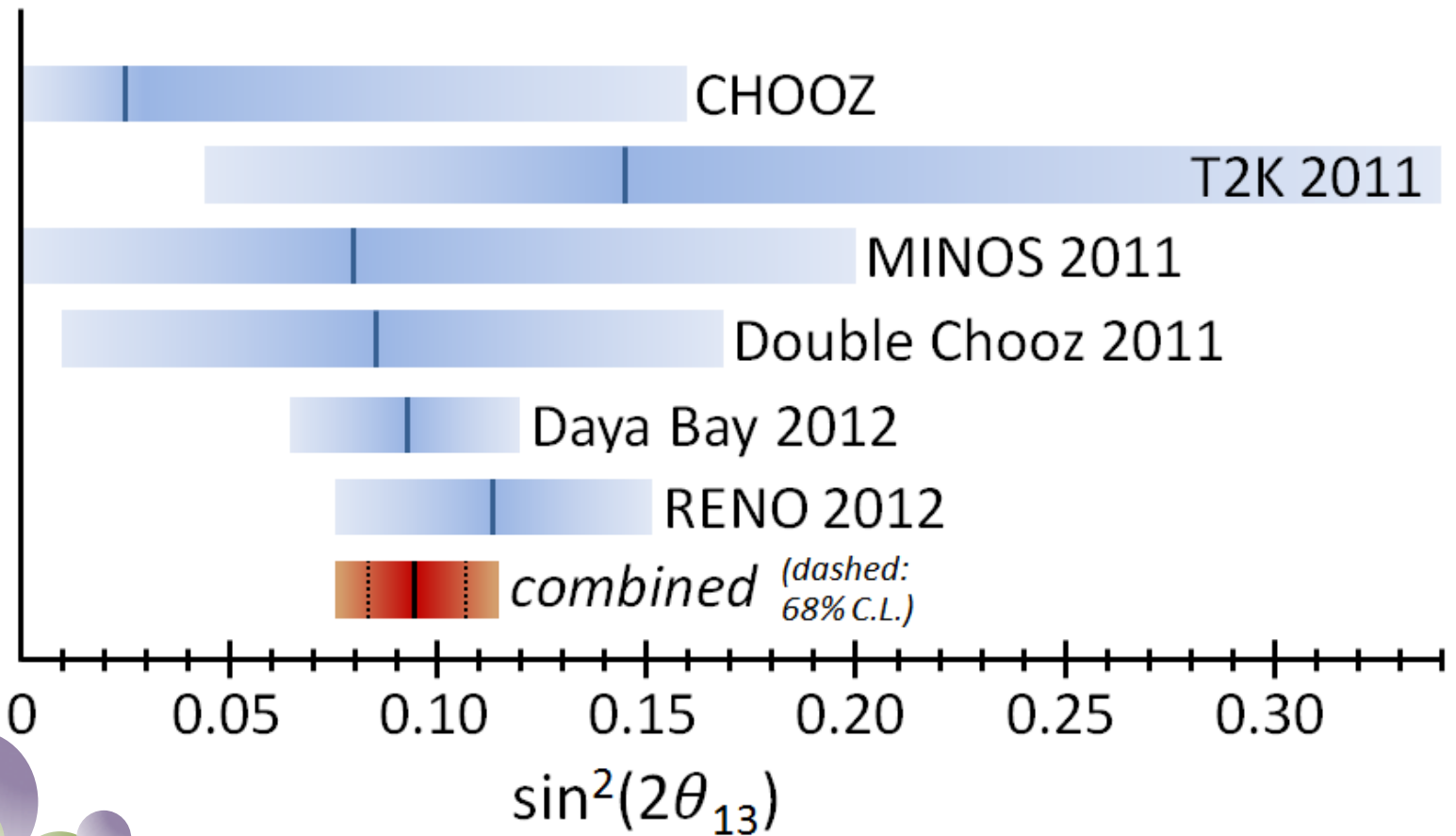
Today's landscape

90% C.L. allowed ranges and best fit values
(assuming $\Delta m^2 > 0$, $\delta = 0$, $\theta_{23} = 45^\circ$)



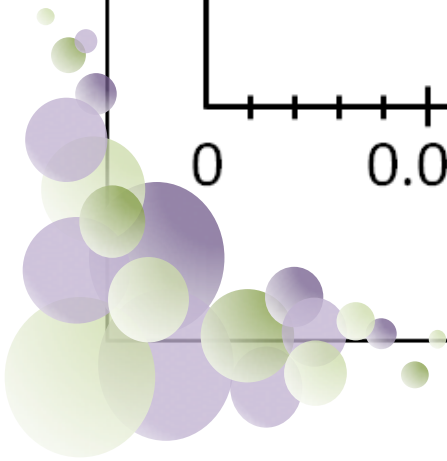
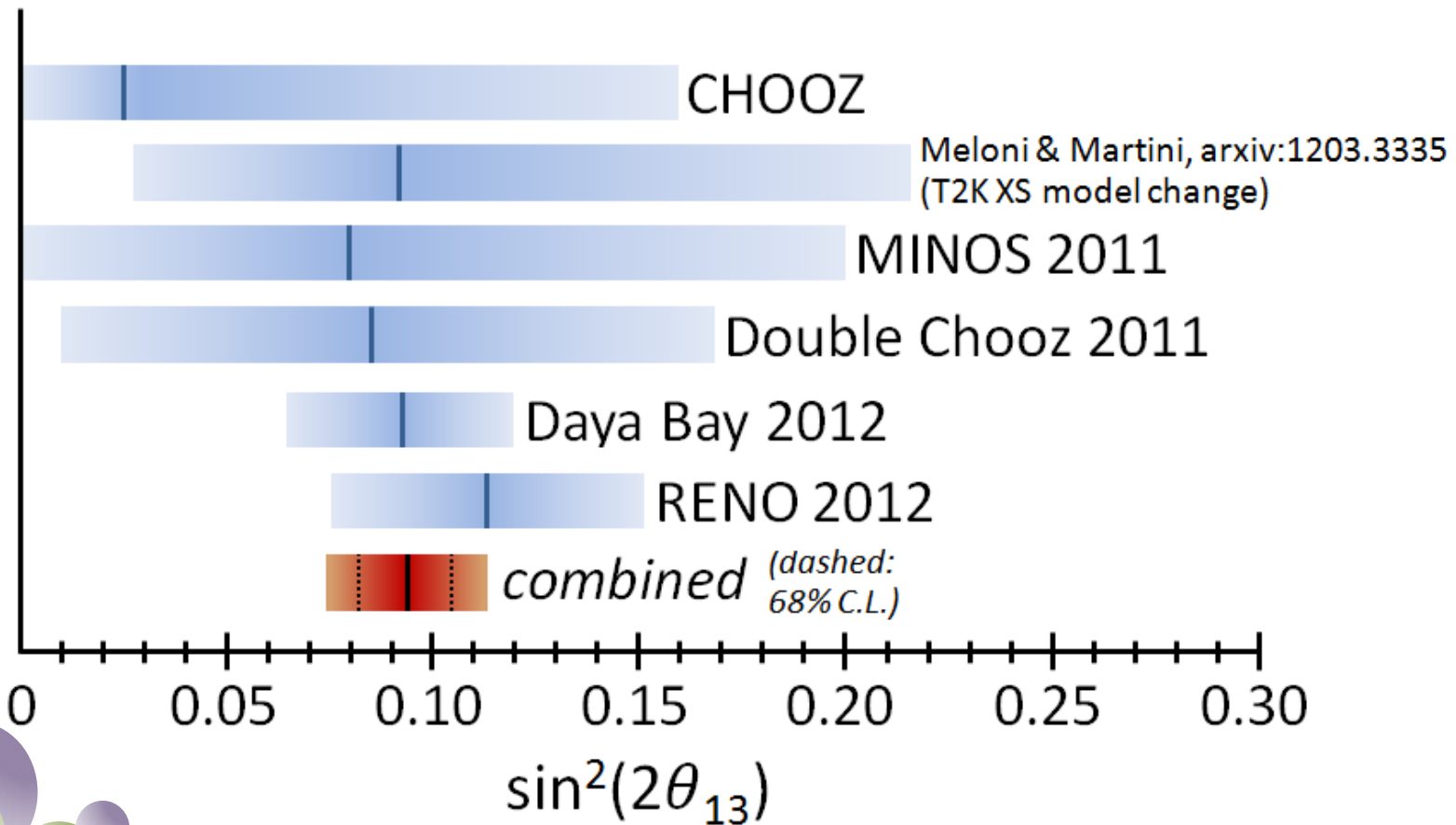
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Combination of Information

- The fact that MINOS is struggling to see this large θ_{13} could be information about mass hierarchy
- This is an example of how, with neutrinos being so difficult to observe, every single neutrino event counts towards the global knowledge

Message

- The world will scramble to be first to get
 - Mass Hierarchy (Japan, China, CERN?)
 - CP violating angle
- FNAL is in very good shape with NOVA
- We can *only improve* the FNAL position with one or two large LAr detectors
- Getting started on a detector soon is paramount: at the surface means faster and cheaper
- Keeps the community focussed and expanding, exploits the NUMI beam, possibly attracts foreign participation
- If we take 5 years to get to CD1, it just is no longer practical for University people to remain interested as they will do it elsewhere (reactors in China is a notable example)

Last Word

- Underground science CAN be done with further excavation at NuMI
- This may take longer, but could build on the information at the time, experience gained from a first 5kT detector, and will have proton decay reach to compliment the CP violation information.
- We have REAL RECEIPTS to show the cost of this excavation, and the running of the facility, we cannot be held hostage to costings which are demonstrably high (or DOEesque)