The Low Energy Neutrino Factory

Setup: $L = 1300$ km, $E_\mu = 4.5$ GeV, flux $= 1.4 \times 10^{21}$ useful muon decays per year per polarity, run time $= 10 + 10$ years.

Detection: 20 kton totally active scintillating detector (TASD) or 100 kton liquid argon (LAr) detector.

Channels:

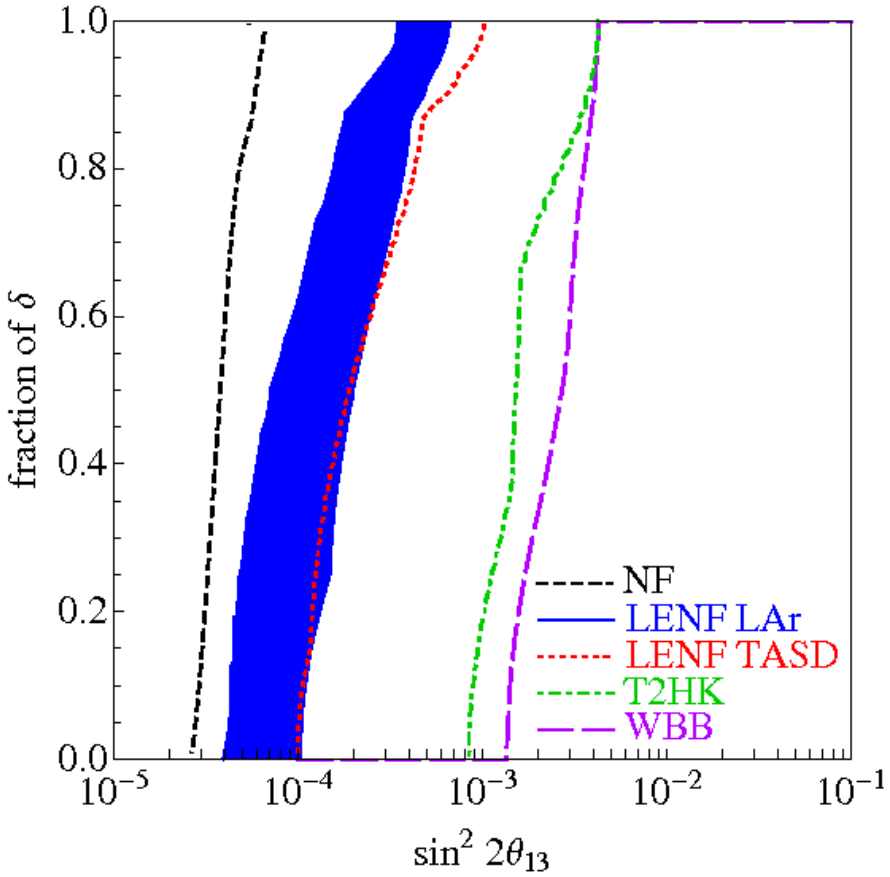
- ν_μ ($\bar{\nu}_\mu$) disappearance
- Golden channel $\nu_e \to \nu_\mu$ ($\bar{\nu}_e \to \bar{\nu}_\mu$)
- Platinum channel $\nu_\mu \to \nu_e$ ($\bar{\nu}_\mu \to \bar{\nu}_e$)

Parameters to measure: standard oscillation (SO) parameters θ_{13}, δ, sign$[\Delta m^2_{31}]$ and non-standard interaction (NSI) parameters $\varepsilon_{e\mu}$, $\varepsilon_{e\tau}$.

A. Bross, M. Ellis, E. Fernández-Martínez, S. Geer, T. Li, O. Mena, S. Pascoli

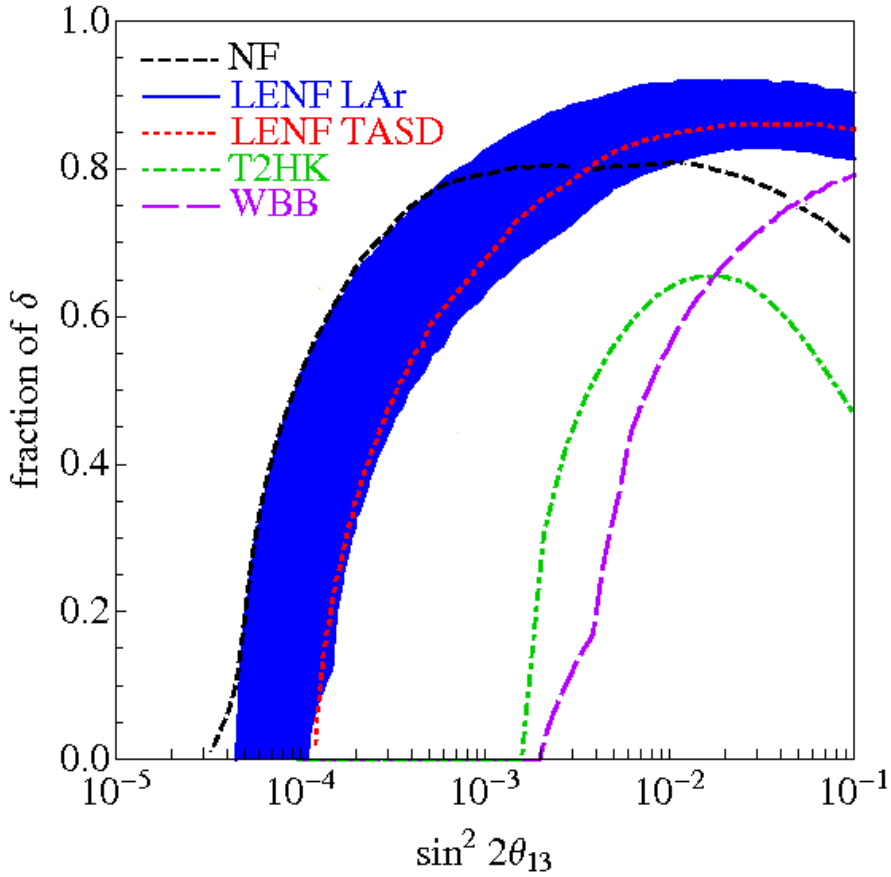
Compare sensitivities of the LENF with TASD or LAr with *IDS neutrino factory*, T2HK and wide-band beam. **The LENF results shown use half of the estimated possible flux** to make a fair comparison.

θ_{13} discovery potential



GLoBES

CP discovery potential



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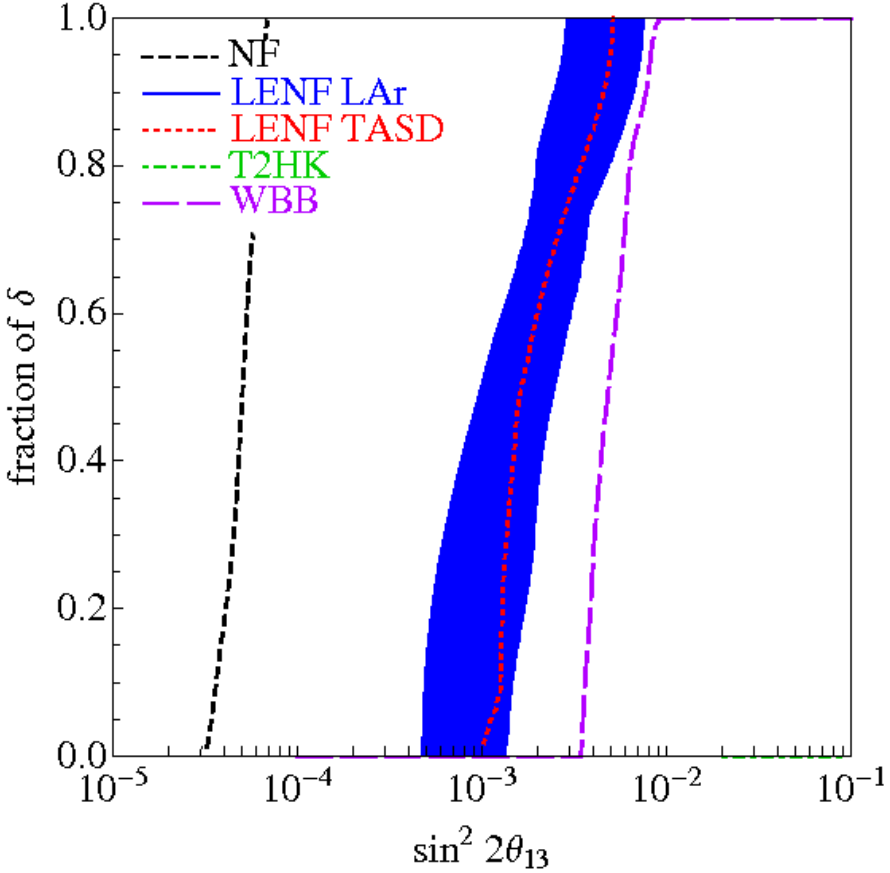
Hierarchy sensitivity



T2HK alone has no sensitivity to the hierarchy.

T2HK+atm. data has sensitivity at $\sin^2(2\theta_{13}) \sim 2 \times 10^{-2}$.

- The LENF has better sensitivity to SO parameters than T2HK or the WBB.
- Using the estimated full exposure of 2.8×10^{23} kton$\times$decays, the LENF has sensitivity to θ_{13} and δ for $\sin^2(2\theta_{13}) > 10^{-4}$ and to the mass hierarchy for $\sin^2(2\theta_{13}) > 10^{-3}$.
- An optimistic LAr detector can produce sensitivities to θ_{13} and δ competitive with the IDS-NF.
- The unique combination of golden and platinum channels can enable the LENF to have competitive sensitivities to NSIs (ongoing work).