NuFIT 5.0: Three-neutrino fit based on data available in July 2020

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ABSTRACT: We present updated results for our global analysis of solar, atmospheric, reactor, and accelerator neutrino data in the framework of three-neutrino oscillations. We also provide $\chi^2$ tables for various one-, two- and three-dimensional projections of the global analysis. If you use these results, please refer to both [1] and [2].

Solar experiments

- External information: Standard Solar Model [3].
- Chlorine total rate [4], 1 data point.
- Gallex & GNO total rates [5], 2 data points.
- SAGE total rate [6], 1 data point.
- SK1 full energy and zenith spectrum [7], 44 data points.
- SK2 full energy and day/night spectrum [8], 33 data points.
- SK3 full energy and day/night spectrum [9], 42 data points.
- SK4 2970-day day-night asymmetry and energy spectrum [10], 24 data points.
- SNO combined analysis [11], 7 data points.
- Borexino Phase-I 741-day low-energy data [12], 33 data points.
- Borexino Phase-I 246-day high-energy data [13], 6 data points.
- Borexino Phase-II 408-day low-energy data [14], 42 data points.
Atmospheric experiments

- **External information**: Atmospheric neutrino fluxes [15].
- IceCube/DeepCore 3-year data [16, 17], 64 data points.
- SK1-4 328 kiloton years [18], $\chi^2$ map [19] added to our global analysis.

Reactor experiments

- KamLAND separate DS1, DS2, DS3 spectra [20] with Daya Bay reactor $\nu$ fluxes [21], 69 data points.
- Double-Chooz FD/ND spectral ratio, with 1276-day (FD), 587-day (ND) exposures [22], 26 data points.
- Daya Bay 1958-day EH2/EH1 and EH3/EH1 spectral ratios [23], 52 data points.
- Reno 2908-day FD/ND spectral ratio [24], 45 data points.

Accelerator experiments

- MINOS 10.71 $\times 10^{20}$ pot $\nu_\mu$-disappearance data [25], 39 data points.
- MINOS 3.36 $\times 10^{20}$ pot $\bar{\nu}_\mu$-disappearance data [25], 14 data points.
- MINOS 10.6 $\times 10^{20}$ pot $\nu_e$-appearance data [26], 5 data points.
- MINOS 3.3 $\times 10^{20}$ pot $\bar{\nu}_e$-appearance data [26], 5 data points.
- T2K 19.7 $\times 10^{20}$ pot $\nu_\mu$-disappearance data [27], 35 data points.
- T2K 19.7 $\times 10^{20}$ pot $\nu_e$-appearance data [27], 23 data points for the CCQE and 16 data points for the CC1$\pi$ samples.
- T2K 16.3 $\times 10^{20}$ pot $\bar{\nu}_\mu$-disappearance data [27], 35 data points.
- T2K 16.3 $\times 10^{20}$ pot $\nu_e$-appearance data [27], 23 data points.
- NOvA 13.6 $\times 10^{20}$ pot $\nu_\mu$-disappearance data [28], 76 data points.
- NOvA 13.6 $\times 10^{20}$ pot $\nu_e$-appearance data [28], 13 data points.
- NOvA 12.5 $\times 10^{20}$ pot $\bar{\nu}_\mu$-disappearance data [28], 76 data points.
- NOvA 12.5 $\times 10^{20}$ pot $\bar{\nu}_e$-appearance data [28], 13 data points.

Description of the $\chi^2$ data tables

We provide four xz-compressed files, containing the $\chi^2$ data tables for both Normal and Inverted Ordering of our global «w/o SK-atm» and «with SK-atm» analyses. Each file is divided into 22 sections, identified by a unique tag and corresponding to a particular one-, two- or three-dimensional projection. The tags and the meaning of the data columns for each section are listed below (note that $\ell = 1$ for NO and $\ell = 2$ for IO).

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<th>2$^{\text{nd}}$ column</th>
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References


[11] SNO collaboration, B. Aharmim et al., Combined Analysis of all Three Phases of Solar Neutrino Data from the Sudbury Neutrino Observatory, 1109.0763.


[16] IceCube collaboration, M. Aartsen et al., Determining neutrino oscillation parameters from atmospheric muon neutrino disappearance with three years of IceCube DeepCore data, Phys. Rev. D91 (2015) 072004 [1410.7227].


