

TFPT Prediction: Neutrino Reactor Angle from the Closed PMNS Branch

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Standalone prediction note – April 27, 2026

Abstract

This note isolates the TFPT row for the reactor angle. The formula retains the compact seed expression, while the status assignment is the neutrino closure map.

Prediction scope and audit

Target. $\sin^2 \theta_{13} = 0.02311$

Status. Physical observable; neutrino closure readout.

Dependency class. neutrino readout N_μ

Kill or pressure test. robust normal-ordering global-fit exclusion at the stated confidence level.

1 Standalone Minimal Kernel

Minimal TFPT kernel used in this prediction

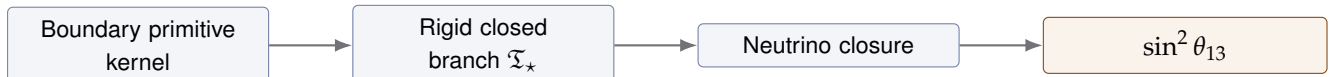
The standalone input package is the boundary-polarized closed branch

$$\mathfrak{G}_{\min} \Rightarrow \mathcal{B}_{\min} \Rightarrow \mathfrak{T}_0^{\min} \Rightarrow (\tau_{\text{dbl}}, \iota_C, P_{\text{prim}}, [u_\Sigma], c_3) \Rightarrow d_{\text{disc}}^* \Rightarrow P_{\text{adm}} \Rightarrow \mathfrak{T}_*$$

The prediction uses only the sector map named in its audit box. Numerical comparison conventions are not theorem inputs; they enter only at the final interface row.

The paper is intentionally one-row: it does not reprove the full TFPT series. It states the minimal closed-branch input needed for this prediction, shows the sector map, and gives the direct failure mode. The source status follows the TFPT 4.5 split: boundary and carrier inputs are core, electromagnetic/flavor/metrology inputs are bridge readouts, QFT closure is conditional, and cosmology rows are downstream comparison targets when explicitly marked.

2 Dependency Graph



NuFIT exclusion

The UV identity is a shadow; the operational row belongs to PMNS/neutrino closure.

3 Derivation

The compact UV identity is

$$\sin^2 \theta_{13} = \varphi_0^{\text{ret}} e^{-\gamma}, \quad \varphi_0^{\text{ret}} = \frac{1}{6\pi} + \frac{3}{256\pi^4}, \quad \gamma = \frac{5}{6}.$$

After sectorization, the physical row is read as

$$\mathfrak{T}_* \longmapsto N_\nu(\mathfrak{T}_*) \longmapsto |(U_{\text{PMNS}}^*)_{e3}|^2.$$

The benchmark target recorded in the prediction table is

$$\sin^2 \theta_{13} = 0.02311.$$

The comparison convention used in the ledger is the NuFIT normal-ordering representative.

4 No-Knobs and Failure Surface

No-knobs audit

The row must not be presented as a free seed projection. Its operational status is neutrino closure; the seed expression is only a compact UV shadow.

5 Minimal Submission Claim

The standalone claim is limited to the displayed target and dependency class. It does not assert that every comparison row of the full TFPT ledger has the same proof status. Any update of the upstream boundary kernel, carrier theorem, or sector map must be propagated into this prediction before the numerical row is distributed.

References

- [1] M. F. Atiyah, V. K. Patodi, and I. M. Singer, *Spectral asymmetry and Riemannian geometry. I*, Math. Proc. Cambridge Philos. Soc. **77** (1975), 43–69.
- [2] A. H. Chamseddine and A. Connes, *The spectral action principle*, Commun. Math. Phys. **186** (1997), 731–750.
- [3] P. J. Mohr, D. B. Newell, and B. N. Taylor, *CODATA recommended values of the fundamental physical constants: 2022 update*, NIST / CODATA reference set, accessed March 2026.
- [4] S. Navas et al. (Particle Data Group), *Review of Particle Physics*, Phys. Rev. D **110** (2024), 030001; 2025 online update.
- [5] NuFIT Collaboration, *NuFIT global analysis of neutrino oscillation data*, website snapshot based on data available through November 2025.
- [6] Planck Collaboration, *Planck 2018 results. VI. Cosmological parameters*, Astron. Astrophys. **641** (2020), A6.
- [7] Y. Minami and E. Komatsu, *New extraction of the cosmic birefringence from the Planck 2018 polarization data*, Phys. Rev. Lett. **125** (2020), 221301.
- [8] X. Chang et al. (for the NA62 Collaboration), *New measurement of $K^+ \rightarrow \pi^+ \nu \bar{\nu}$ branching ratio at the NA62 experiment*, arXiv:2604.12649.
- [9] KOTO Collaboration, *Search for the $K_L \rightarrow \pi^0 \nu \bar{\nu}$ decay at the J-PARC KOTO experiment*, arXiv:2411.11237.