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CP-Violating Neutrino Non-Standard Interactions in Long-Baseline-Accelerator Data

Neutrino oscillations in matter provide a unique probe of new physics. Leveraging the advent of neutrino appearance data from NOvA and T2K in recent years, we investigate the presence of CP-violating neutrino non-standard interactions in the oscillation data. We first show how to very simply approximate the expected NSI parameters to resolve differences between two long-baseline appearance experiments analytically. Then, by combining recent NOvA and T2K data, we find a tantalizing hint of CP-violating NSI preferring a new complex phase that is close to maximal: $\delta_{\text{NSI}} \approx 3\pi/2$ with $|\delta_{\text{NSI}}| \approx 0.2$ or $|\delta_{\text{NSI}}| \sim 0.2$. We then compare the results from long-baseline data to constraints from IceCube and COHERENT.

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