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Possible indication of non-standard neutrino interactions from NOvA and T2K

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The latest data of the two long-baseline accelerator experiments NOvA and T2K, interpreted in the standard 3-flavor scenario, display a tension. A mismatch in the determination of the standard CP-phase δ_{CP} extracted by the two experiments is evident in the normal neutrino mass ordering. While NOvA prefers values close to $\delta_{\text{CP}} \sim 0.8\pi$, T2K identifies values of $\delta_{\text{CP}} \sim 1.4\pi$. Such two estimates are in disagreement at more than 90% C.L. for 2 degrees of freedom. In this talk, we show that such a discrepancy can be resolved if one hypothesizes the existence of complex neutral-current non-standard interactions (NSI) of the flavor changing type involving the $e - \mu$ or the $e - \tau$ sectors with couplings $|\varepsilon_{e\mu}| \sim |\varepsilon_{e\tau}| \sim 0.2$. Remarkably, in the presence of such NSI, both experiments point towards the same common value of the standard CP-phase $\delta_{\text{CP}} \sim 3\pi/2$. Our analysis also highlights an intriguing preference for maximal CP-violation in the non-standard sector with the NSI CP-phases having best fit close to $\phi_{e\mu} \sim \phi_{e\tau} \sim 3\pi/2$, hence pointing towards imaginary NSI couplings.

Collaboration name

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