Contribution ID: **1** Type: **not specified**

Neutrino non-standard interactions: a possible solution to the NOvA and T2K tension

Thursday 29 July 2021 10:00 (20 minutes)

The latest data of the two long-baseline accelerator experiments NOvA and T2K, analysed in the standard 3-flavor scenario, display a discrepancy. 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 $\delta_{CP} \sim 0.8\pi$, T2K identifies values of $\delta_{CP} \sim 1.4\pi$. Such two estimates are in disagreement at more than 90% C.L. for 2 d.o.f.. We show that such a tension can be resolved if one hypothesizes the existence of complex neutral-current non-standard interactions (NSI) of the flavor changing type involving the $-\mu$ or the $-\tau$ sectors with couplings $|\varepsilon_{e\mu}| \sim |\varepsilon_{e\tau}| \sim 0.2$. We find that in case of normal mass ordering there is a 2.1σ preference of the non-zero NSI coupling $|\varepsilon_{e\mu}|$ and 1.9σ preference of $|\varepsilon_{e\tau}|$. Remarkably, in the presence of such NSI, both experiments point towards the same common value of the standard CP-phase $\delta_{CP} \sim 3\pi/2$. Our analysis also highlights an intriguing preference for maximal CP-violation in the non-standard sector with the dynamical NSI CP-phases having best fit close to $\phi_{e\mu} \tilde{} \phi_{e\tau} \tilde{} 3\pi/2$. Although not very strong this might be a possible sign of physics beyond the Standard Model. It is also worth to mention that in case of inverted ordering the preference of non-zero NSI couplings |\varepsilon_{e\mu}| and |\varepsilon_{e\tau}| lies only at 1σ confidence level respectively.

Author: Dr CHATTERJEE, Sabya Sachi (IPPP, Durham University)

Co-author: PALAZZO, Antonio (University of Bari and INFN)

Presenter: Dr CHATTERJEE, Sabya Sachi (IPPP, Durham University)

Session Classification: NuCo 2