Contribution ID: **74** Type: **Poster**

Exploring Scalar Non-Standard Interactions at DUNE and P2SO

Friday, 21 June 2024 17:30 (2 hours)

In the realm of physics beyond the Standard Model, Non-Standard Interactions (NSI) in neutrinos have emerged as a significant area of interest. While NSIs of neutrinos are mediated by a vector field (Z'), recent research has delved into a novel form of neutrino interaction with matter mediated by light scalar particles, known as Scalar NSI (SNSI). SNSI appears as a Yukawa coupling term, altering the neutrino mass matrix and consequently affecting neutrino oscillations. It emerges as an additional matrix, giving rise to three real diagonals ($\eta_{\alpha\alpha}$) and three complex off-diagonals ($\eta_{\alpha\beta}$) SNSI parameters, which are dimensionless in nature. Our motivation for this work is to put bounds on these SNSI parameters, especially off-diagonal parameters ($\eta_{e\mu}$, $\eta_{e\tau}$ and $\eta_{\mu\tau}$). These are associated with new CP phases ($\phi_{\alpha\beta}$) that can have an additional impact on the sensitivity to determine the unknowns of the neutrino sector. We have shown the impact of SNSI parameters in the context of two future-based long baseline experiments, DUNE and P2SO and obtained more constrained sensitivity limits on $\eta_{e\mu}$ and $\eta_{e\tau}$ compared to $\eta_{\mu\tau}$ at 3σ C.L. Additionally, we have studied the non-trivial behaviour of the oscillation parameter Δm^2_{31} in the presence of SNSI parameters for P2SO and DUNE experiments.
We have observed that SNSI parameters significantly affect the CPV sensitivity of the long-baseline experiments. Interestingly, certain values of the SNSI parameters can vanish the CP sensitivity of both experiments.

Poster prize

Yes

Given name

Sambit Kumar

Surname

Pusty

First affiliation

University of Hyderabad, Hyderabad, India, 500046

Second affiliation

Institutional email

21phph23@uohyd.ac.in

Gender

Male

Collaboration (if any)

Primary author: PUSTY, Sambit Kumar (University of Hyderabad, Telangana)

Co-authors: Mr SINGHA, Dinesh Kumar (University of Hyderabad, Telangana); Dr GHOSH, Monojit (Center of Excellence for Advanced Materials and Sensing Devices, Ru{\dj}er Bo\v{s}kovi\'c Institute, 10000 Zagreb, Croatia); Dr MAJHI, Rudra (Nabarangpur College, Nabarangpur - 764063, Odisha, India); Prof. MOHANTA, Rukmani (University of Hyderabad, Telangana)

Presenter: PUSTY, Sambit Kumar (University of Hyderabad, Telangana)

Session Classification: Poster session and reception 2

Track Classification: Beyond Standard Model searches in the neutrino sector