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Effect of torsion in long-baseline neutrino oscillation experiments

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In this work we have investigated neutrino oscillation in the presence of gravity, in particular the contorsion, which is the non-dynamical part of spin connection. The contraction of contorion field with tetrad gives us torsional coupling constants which can be probed by future long-baseline neutrino experiments like DUNE and P2SO. We use the notations λ'_{21} and λ'_{31} to define the torsional couplings in this study. We scrutinize the effect of new torsional couplings on neutrino oscillation probability; appearance and disappearance channel. It turns out that, appearance (disappearance) channel gets more affected by λ'_{21} (λ'_{31}) when we take one coupling at a time. This feature encourages us to place bounds on the two torsional couplings λ'_{21} and λ'_{31} from P2SO and DUNE. The outcome shows that P2SO provides more parameter constraints than DUNE. Furthermore, we have demonstrated the shift in the sensitivities of mass ordering, octant of the atmospheric mixing angle θ_{23}, and CP violation when the new couplings are present. The outcome indicates that changing $\lambda'_{(2,3)1}$ from zero to non-zero value significantly alters each sector of physics sensitivity.

Poster prize

Yes

Given name

Papia

Surname

Panda

First affiliation

University of Hyderabad

Second affiliation

Institutional email

20phph05@uohyd.ac.in

Gender

Female

Collaboration (if any)

Autore principale: PANDA, Papia (University of Hyderabad)

Coautore: Sig. SINGHA, Dinesh Kumar (University of Hyderabad); Dr. GHOSH, Monojit (Center of Excellence for Advanced Materials and Sensing Devices, Ruder Bošković Institute); Prof. MOHANTA, Rukmani (University of Hyderabad)

Relatore: PANDA, Papia (University of Hyderabad)

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