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Hierarchy and NSI study of P2O in its Optimal Configuration

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We have studied the hierarchy sensitivity of Protvino to ORCA (P2O) experiment in standard three flavor oscillation and in the presence of NSI. As P2O has a baseline of 2595 km, it is expected that P2O should have better sensitivity to mass hierarchy and NSI compared to the DUNE experiment. Despite having higher appearance events in minimal P2O than DUNE, we noticed that it has less sensitivity to hierarchy than DUNE. The hierarchy sensitivity of P2O becomes equivalent to DUNE for $\delta_{CP} = 195^\circ$ for a background reduction factor of 0.46 and appearance channel background systematic normalization of 4%. We name this configuration as Optimized P2O in our work. We see that $\epsilon_{e\tau}$ ($\epsilon_{e\mu}$) sensitivity of optimized P2O is better (similar) than DUNE when both $\epsilon_{e\mu}$ and $\epsilon_{e\tau}$ are considered in the analysis. We find that the change in hierarchy sensitivity of P2O is more significant compared to DUNE in the presence of NSI. Further, the hierarchy sensitivity in the presence of NSI is higher (lower) than the standard three flavor case for $\delta_{\rm CP} = 270^\circ (90^\circ)$.

In-person participation

Yes

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