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The unitarity of neutrino mixing in light of atmospheric and reactor oscillation data

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While the unitarity of the neutrino mixing matrix is postulated in the standard three-flavour paradigm, it can be verified experimentally through neutrino oscillation measurements. In this study, we combine recent public data from the atmospheric and reactor neutrino experiments —including IceCube-DeepCore, Daya Bay, and KamLAND —and place model-independent constraints on the individual elements of the PMNS mixing matrix. To quantify non-unitarity, we compute the credible intervals for the normalizations of the matrix rows and columns and the closures of the unitarity triangles, highlighting the role of the atmospheric neutrino systematic uncertainties in our results. Finally, we report the sensitivity projections for the non-unitarity constraints that will be possible with the next generation of atmospheric and reactor neutrino experiments, focusing on IceCube-Upgrade and JUNO as direct successors to the experiments analyzed in this work.

Poster prize

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