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Experimental test of the unitarity of the leptonic mixing (PMNS) matrix

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In the past decade, a remarkable progress has been made in the neutrino oscillation determining the lepton mixing (PMNS) angles, except for the CP violating phase delta_CP. The next step is to determine this remaining phase and then over-constraining the PMNS matrix to test its unitarity. Testing the unitarity is an effective way to search for physics beyond the standard model, as is demonstrated in the quark sector. For example, existence of right handed neutrinos or sterile neutrinos would violate the unitarity, and so does new interaction beyond the standard model. In this talk, I will describe the potential path towards testing the unitarity of the PMNS matrix. In particular, CP violation in the baseline length of solar neutrino oscillation provides key information, which the existing Super-Kamiokande data may even start to be sensitive. I will conclude with a prospect of the future experiments to make a stringent test of the unitarity of the PMNS matrix, showing that the accelerator and atmospheric neutrino measurement by Hyper-Kamiokande would take the central role.

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