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Neutrino Physics: The PMNS mixing matrix

Since the elegant proposal of a new way to represent neutrinos [1] as linear combinations of new mass eigenstates, it has become a great challenge to not only understand how this process works in nature but to measure the combinations rates, and directly detect neutrinos. With the indirect detection of neutrinos and later confirmation of oscillations, neutrino physicists today focus on measuring the mixing parameters [2] and explain the mechanism that bestows neutrinos with masse [3], the latter which necessitate physics beyond Standard Model of Particle Physics.

In this work, we will review the most important properties of neutrinos and explain the development of the PMNS mixing matrix and its implications.

References

- [1] Maki, Z., Nakagawa, M., & Sakata, S. (1962). Remarks on the unified model of elementary particles. *Progress of Theoretical Physics*, 28(5), 870-880.
- [2] C. Patrignani et al. (Particle Data Group), *Chin. Phys. C*, 40, 100001 (2016) and 2017 update.
- [3] De Gouvêa, A. (2016). Neutrino mass models. *Annual Review of Nuclear and Particle Science*, 66, 197-217.

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