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The neutrino flavor puzzle

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A remarkable breakthrough in neutrino physics has been witnessed in recent years. Neutrino oscillation experiments have firmly established the existence of neutrino masses and leptonic mixing, which represents a solid evidence of physics beyond the Standard Model. We present a brief overview of the neutrino flavor puzzle, with emphasis on theoretical approaches to address this problem. A possible path towards the solution of this puzzle consists on requiring some of the elements in the leptonic mass matrices to vanish. Such texture zeros can be enforced by means of Abelian symmetries. We present some examples of the implementation of maximally restrictive texture zeros in the context of two-Higgs-doublet models with Majorana neutrinos. We also discuss the ultraviolet completion of these models in the framework of the seesaw mechanism for neutrino masses.

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