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## **An Exercise in Frugality, what do we know about the PMNS Matrix?**

We investigate precisely what can be extracted from the current appearance and disappearance oscillation data in regards the  $3 \times 3$  PMNS matrix, without explicitly assuming unitarity. Our canonical model of this unitarity violation is an added sterile neutrino, whose mass and mixing are not fully resolvable in current generation experiments, or does not take part in oscillations. Further constraints on deviations from unitarity from lepton universality and rare lepton decays are discussed to further bound the lepton mixing matrix, and future experiments that can improve the situation are investigated.

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