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P3.041 Neutrino mass sum rules

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Neutrino mass sum rules are an important class of predictions in flavour models relating the Majorana phases to the neutrino masses. This leads, for instance, to enormous restrictions on the effective mass as probed in experiments on neutrinoless double beta decay. While up to now these sum rules have in practically all cases been taken to hold exactly, we will go here beyond that. After a discussion of the types of corrections that could possibly appear and elucidating on the theory behind neutrino mass sum rules, we estimate and explicitly compute the impact of radiative and model corrections. The radiative corrections generally appear and thus hold for whole groups of models. The model corrections instead strongly depend on the concrete model. We discuss all neutrino mass sum rules currently present in the literature, which together have realisations in more than 50 explicit neutrino flavour models. We find that, while the effect of the renormalisation group running can be visible, the qualitative features do not change. This changes somewhat for the model dependent corrections which might alter even the qualitative predictions but only for large corrections and a high neutrino mass scale close to the edge of the current limits. This finding backs up the solidity of the predictions derived in the literature apart from some exceptions, and it thus marks a very important step in deriving testable and reliable predictions from neutrino flavour models.