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Neutrino mass sum rules from modular A_4 invariance

Modular symmetries are a novel approach to understanding the flavour structure of leptonic mixing. Using the modular A_4 flavour symmetry integrated into a type-II seesaw, we propose a simple and minimalistic model that restricts the neutrino oscillation parameter space. Most importantly, this setup leads to a sum rule in the physical neutrino masses. When combined with the mass squared differences observed in neutrino oscillations, this sum rule determines the absolute neutrino mass scale. This has significant implications for cosmology, neutrinoless double beta decay experiments, and direct neutrino mass measurements. In particular, the model predicts $\sum_i m_i \approx 0.1$ eV for both normal and inverted ordering, and thus can be fully probed by the current generation of cosmological probes in the upcoming years. Furthermore, our model has precise predictions for mixing angles which can be tested in future experiments.

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