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Neutrino Mass Sum Rules from Modular \mathcal{A}_4 Symmetry

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Modular symmetries offer a dynamic approach to understanding the flavour structure of leptonic mixing. Using the modular \mathcal{A}_4 flavour symmetry integrated in a type-II seesaw, we propose a simple and minimalistic model that restricts the neutrino oscillation parameter space and, most importantly, introduces 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 Specifically, our 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.

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