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Large lepton mixing angles from a 4+1-dimensional $SU(5) \times A_4$ domain-wall braneworld model

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We propose an extension of the 4+1D $SU(5)$ domain-wall braneworld of Davies, George and Volkas which includes the addition of a discrete A_4 flavor symmetry. We show that lepton mixing and light Majorana neutrino masses can be generated from the additional A_4 physics while at the same time sufficient parameter freedom can be maintained in the charged fermion sector to produce charged fermion masses and quark mixing naturally from the split fermion mechanism of Arkani-Hamed and Schmalz. Importantly, we show that the vacuum realignment problem typical of discrete flavor symmetry models of quark and lepton mixing can be solved by separating the appropriate flavons in the extra dimension, leading to exponentially sensitive suppression of the operators responsible for vacuum realignment.

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