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Brane world mass unification of quarks and leptons¹ MEHRDAD ADIBZADEH, P.Q. HUNG, University of Virginia — We present a scenario combining a model of early (TeV-scale) unification of quarks and leptons with the physics of large extra dimensions, which provides a natural mechanism linking quark and lepton masses at TeV scales. In demonstrating "quark-lepton mass unification" within our model, we make use of the mechanism of wave function overlap along the large extra dimension. The mechanism connects the strengths of fermionic mass terms in four dimensions, as "effective" Yukawa couplings, to the magnitudes of overlaps between the wave functions of left- and right-handed fermions along a compact spatial dimension. The geometry of localized fermions in the extra dimension, which is determinant of such "mass unification," is set by symmetry breakings. As a result, the TeV-scale quark-lepton symmetry structure translates into an early mass relation between quarks and leptons with implications on the mass of Dirac neutrino.

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