

Abstract for an Invited Paper
for the APR09 Meeting of
The American Physical Society

Quark Mixing, Neutrino Mixing, Charged Lepton non-Mixing

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The mixing of flavor and mass eigenstates in the quark sector is by now well-known and well-measured through the CKM matrix. We also know that the neutrino flavor and mass eigenstates mix (but with a strikingly different mixing pattern) through the MNS matrix. The puzzle is not so much why these mixings occur, but rather why the charged leptons apparently do not mix. Despite many sensitive searches, flavor mixing of the charged leptons has never been observed. New experiments will push these searches to unprecedented levels. Perhaps charged lepton mixing will finally be observed, perhaps not. In either case the results will shed light on the nature of leptons and the existence and nature of Supersymmetry.