Abstract Submitted
for the NWS09 Meeting of
The American Physical Society

Quarks, Leptons, and Density Matrices CARL BRANNEN — For an operator to be a pure density matrix it is necessary and sufficient that it be Hermitian, have trace one, and it be a projection operator. These are commonly generalized by giving up the projection operator requirement; the result are mixed density matrices convenient for modeling statistical mixtures. Other generalizations are also interesting. We solve for the Hermitian projection operators of a simple algebra based on the permutations of three elements, and show that the solutions give the weak quantum numbers, (t_0, t_3), of the quarks and leptons.

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Date submitted: 15 Apr 2009 Electronic form version 1.4