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Classification of Hadron Bound States CARL BRANNEN, Liquafaction Corp. — Consider a system where a small number of valence fermions interact with each other through an unspecified potential. As usual, a complete set of commuting operators define a set of bound states that are orthonormal. We work with density matrices so that a complete basis set of bound states are primitive idempotents that annihilate each other. That is, $\rho_n\rho_m = \rho_n\delta_{nm}$ and $tr(\rho) = 1$. As an example, we use the bound states of the hydrogen atom. In order to model deeply bound particles, we suppose that the continuous degrees of freedom for the wave functions is reduced to a small finite number. We analyze the structure of complete basis sets of primitive idempotent NxN complex matrices for N=2 and N=3. For the baryons, we assume that the three colors of the valence quarks give N=3 and conclude that their resonances will appear in groups of three with the same quantum numbers, for example, $\{\Delta(1232), \Delta(1600), \Delta(1920)\}$ each of which is P_{33}. We discuss applications of the theory to classifying the mesons. We discuss Koide's mass formulas for the leptons and extensions to formulas for triples of hadrons.

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