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Electromagnetic Fields Manifested in the Solutions of an Augmented Dirac Equation WEN-TAI LIN, Retired — When the 2-by-2 Pauli's spin matrices are augmented to a set of 4-by-4 counterparts, a Dirac-like equation may be formed out of a corresponding set of 8-by-8 gamma matrices. The Dirac-like equation may yield solutions in the form of a pair of 4-vectors, in addition to the conventional bi-spinor solutions. We show that the 4-vector solutions not only accurately manifest all the Maxwell's and Proca's electromagnetic field equations, but also provide a means to resolve the infinite self-energy issues associated with a charged particle. For example, with an inherent Green function and some proper parameterization of the charge density of a source, the equation yields three types of potential functions, all guaranteed to have limited electromagnetic self-energy and covering long/short ranges, strong/weak electromagnetic forces. One of the potential functions is a modified Coulomb potential. Implications of the modified Coulomb potential to Lamb shift and the classical issue of 4/3 electromagnetic energy-to-mass ratio will be presented.

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