Abstract Submitted
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Field-theory calculation of the electric dipole moment of the neutron and paramagnetic atoms[1] JOEL GRIFFITH, University of Notre Dame, STEVEN BLUNDELL, CEA/UJF-Grenoble, JONATHAN SAPIRSTEIN, University of Notre Dame — Electric dipole moments (edms) of bound states that arise from the constituents having edms are studied with field-theoretic techniques. The systems treated are the neutron and a set of paramagnetic atoms. In the latter case it is well known that the atomic edm differs greatly from the electron edm when the internal electric fields of the atom are taken into account. In the nonrelativistic limit these fields lead to a complete suppression, but for heavy atoms large enhancement factors are present. A general bound-state field theory approach applicable to both the neutron and paramagnetic atoms is set up. It is applied first to the neutron, treating the quarks as moving freely in a confining spherical well. It is shown that the effect of internal electric fields is small in this case. The atomic problem is then revisited using field-theory techniques in place of the usual Hamiltonian methods, and the atomic enhancement factor is shown to be consistent with previous calculations. Possible application of bound-state techniques to other sources of the neutron edm is discussed.

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