

It is shown that field-theory based single-boson-exchange potentials cannot be identified to those of the Yukawa or Coulomb type that are currently inserted in the Schrödinger equation. The potential which is obtained rather corresponds to this current single-boson-exchange potential corrected for the probability that the system under consideration is in a two-body component, therefore missing contributions due to the interaction of these two bodies while bosons are exchanged. The role of these contributions, which involve at least two-boson exchanges, is examined. The conditions that allow one to recover the usual single-boson-exchange potential are given. It is shown that the present results have some relation: (i) to the failure of the Bethe-Salpeter equation in reproducing the Dirac or Klein-Gordon equations in the limit where one of the constituents has a large mass, (ii) to the absence of corrections of relative order $\alpha \log 1/\alpha$ to a full calculation of the binding energy in the case of neutral massless bosons or (iii) to large corrections of wave-functions calculated perturbatively in some light-front approaches