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Bound state basics

Friday 19 July 2024 18:00 (15 minutes)

Bound state constituents move in the instantaneous potential generated by their companions. QED and QCD have instantaneous potentials when the gauge is fixed over all space at an instant of time (eg., Aˆ0=0). Thus the Schrödinger equation can be generalised to relativistic motion [1].

The QCD potential felt by a quark or gluon can be non-vanishing at spatial infinity for color singlet states, since the combined potential generated by all constituents vanishes. Maintaining Poincare symmetry leaves a single universal parameter: the (spatially constant) gluon field energy density.

Consequences: The gluon energy density gives the QCD hadron scale. Color singlet q qbar states are bound by a linear potential, qqq and q qbar g states have corresponding confining potentials. Full Poincare covariance of EM form factors for relativistic bound states is demonstrated for the first time in a Hamiltonian framework [2]. The hadron spectrum has promising features [1].

[1] 2101.06721
[2] 2304.11903

Alternate track

I read the instructions above

Yes

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