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Aspects of the ladder approximation bound state spinor-spinor Bethe-Salpeter equation

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Following a summary of relevant features of the bound state spinor-spinor Bethe-Salpeter equation, the normalisation of Bethe-Salpeter amplitudes is examined, and it is shown that for at least one ladder approximation spinor-spinor solution, the two commonly written forms of the normalisation condition appear to be inequivalent.

We then examine symmetries of the coupling parameter λ, and demonstrate that λ is an even function of both the bound state mass and the difference between the masses of the constituent particles.

Next we examine the unequal-mass spinor-spinor Bethe-Salpeter equation for systems with zero bound state mass. Coupled radial equations are derived, and their symmetries examined. The numerical behaviour of λ as a function of the ratio of the constituent particle masses is examined for known analytical equal-mass solutions.

A perturbation method is then employed to investigate the behaviour of λ for small values of the exchange boson mass.

After this certain aspects of the equal-mass Bethe-Salpeter equation are examined. For systems with zero bound state mass, we consider the analysis of a search for SV sector solutions, and also examine solutions for a model involving the exchange of both vector and pseudoscalar bosons. Finally we consider the solution of the radial equations for non-zero

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bound state mass, using numerical methods together with a perturbation approach.

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