

Relations between scattering amplitude and Bethe-Salpeter wave function in quantum field theory

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We discuss an exact relation between the two-particle scattering amplitude and the Bethe-Salpeter (BS) wave function inside the interaction range in quantum field theory. In the relation the reduced BS wave function given by the BS wave function plays an essential role. Through the relation the on-shell and half off-shell amplitudes can be calculated.

We also show that the solution of Schrodinger equation with the effective potential determined from the BS wave function gives a correct on-shell scattering amplitude only at the momentum where the effective potential is calculated.

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