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**Use of Hulthen potential in Light-Front Two-Body Bound-State problem** YUKIHISA TOKUNAGA, North Carolina State University — Solving the relativistic bound-state problem is an important task in nuclear physics. Even the two-body bound-state problem has been solved only under a certain approximation due to the nonperturbative nature. The two-body Bethe-Salpeter equation in the Wick-Cutkosky model was often solved in the ladder approximation without including the cross-ladder contribution, although many different and more accurate treatments of the numerical method to solve the bound-state problem have been developed nowadays. In this presentation, we use the exact solution to Hulthen potential as a trial wave function to solve the two-body bound-state problem based on the variational principle. We extend the light-front ladder approximation to include the cross-ladder contribution and present the numerical result of the binding energy versus the coupling constant including the particle and antiparticle effect to the cross-ladder contribution. In particular, we discuss the case with the exchange particle of non-zero mass to compare the effect in the Coulomb potential vs. the Yukawa potential. We show the effectiveness of our new trial wave function in variational method based on the Hulthen potential and further explain the individual contribution from the cross-ladder and the stretched-box.

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