Euclidean to Minkowski Bethe Salpeter amplitude and observables

T. Frederico, J. Carbonell and V. Karmanov

The Bethe-Salpeter (BS) amplitude can be represented, both in Euclidean and Minkowski spaces, via a Nakanishi integral representation containing a weight function. Knowing the BS amplitude which can be found by, e.g. lattice calculations, or, more easy, in models (OBE, for instance), one can invert the Nakanishi kernel, find the weight function, and then, again via the Nakanishi integral, obtain the BS amplitude, already in Minkowski space, and calculate observables. The weight function can be also found by inverting the corresponding integral representation of the light front wave function. The inversion procedure is, in general, rather unstable, however, we have found a method which considerably reduces the numerical instabilities. Comparing the weight functions extracted from the Euclidean BS amplitude and from the light front wave function, both calculated in the OBE framework, we find very close results. We use this weight function to find electromagnetic form factors. The latter ones are very stable in spite of the residual numerical instability of the weight function. This demonstrates, how the observables indeed can be calculated starting with the available Euclidean solutions and the Nakanishi integral representation.