

Asymptotic Properties of Resonance and Weakly-Bound States in the Shell-Model Calculations

Yu.M. Tchuvil'sky

Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University

Progress of shell-model (SM) and related high-quality studies of nuclear structure generates a need for accurate approaches involving the results of these studies in treatment of nuclear reactions and decays. The key problem of approaches of such a type is to connect the asymptotic properties of entrance and/or exit reaction channels with a SM solution of A -nucleon problem and the main obstacle makes this problem difficult is a relatively small space area in which the A -nucleon solutions are valid.

A hybrid approach involving both algebraic methods and methods of continuous mathematics focused on the problem is demonstrated. The former methods (algebraic version of the resonating group model in the form presented in [1], for example) are well-suited to be combined with the SM approaches and the latter ones (Green functions method, first of all) are convenient for the description of asymptotics of continuum and weakly-bound states. In the present talk the consideration is limited by discussion of nucleus-nucleon channels.

One of the advantages of the approach is that it is workable not only in the case that SM wave functions are accurately computed but even in the case that the results of SM calculations are very limited. This property makes the approach promising to be used in an area of reactions with relatively heavy nuclei.

1. Igashov S.Yu. and Tchuvil'sky Yu. M. // NTSE-2012. Khabarovsk, 2012. Proceedings of the International Workshop (Khabarovsk, 2013) p. 92.