Bounds on variation of the spectrum and spectral subspaces of a few-body Hamiltonian

Alexander K. Motovilov

Bogoliubov Laboratory of Theoretical Physics, JINR, Dubna, Russia

We start with a discussion of known bounds on variation of the spectrum and spectral subspaces of an abstract Hermitian operator under a perturbation. Then we apply these results to few-body Hamiltonians. In particular, we give a priory estimates on the shifts of binding energies and variation of the corresponding eigensubspaces of a few-body Schrödinger operator if an extra interaction or an external field is added, provided that positions of the initial binding energies are known. It should be underlined that our estimates are not perturbative in the sense of the conventional perturbation theory. The bounds we give only involve the distance between parts of the spectrum of the initial Hamiltonian and the norms for operators that describe the additional potentials/fields. These bounds might also be useful in control of the quality of numerical calculations.