

Proton emission from Gamow resonance

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Nuclear states decaying predominantly by proton emission are often described by using single particle (s.p.) proton states with complex energy eigenvalues i.e. by Gamow resonances. The total s.p. width Γ_{sp} is proportional to the imaginary part of the energy eigenvalue of the Gamow resonance. Measured life time of the parent state is calculated from Γ_{sp} and the spectroscopic factor which carries the structure information. This convenient approximation is used even for deformed nuclear shapes where the deformation couples channels with different partial waves. We developed a computer code: CCGAMOW which solves coupled Schroedinger equation for axially symmetric potential numerically by using the piecewise perturbation method. The code gives the complex energy eigenvalue and eigenfunction of the deformed Gamow resonance with high accuracy. The present version uses the adiabatic approximation i.e. it is assumed that the energies of the ground and excited states of the daughter nucleus are degenerate. If we use particle plus rotor model in strong coupling limit the partial widths belonging to the excited states and Γ_{sp} are somewhat overestimated. The effect of this degeneracy is studied in the example of the proton emission from the ground state of ¹⁴¹Ho deformed nucleus and found to be generally small.