Boundary Conditions of Resonant states.

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We analyze the resonant behavior of one-channel one dimensional systems with a finite range of interaction. This is done by studying various scattering functions (time delay, probability trapping and cross section) within the framework of Reaction Matrix theory and also in terms of an effective non-hermitean Hamiltonian H_{eff}. It is shown that in order to use a one (reaction matrix) level approximation the appropriate or physical boundary condition of the resonant state must be used. We show a simple procedure to determined the physical boundary conditions of the resonant states. It is also shown that only for nearly Neumann boundary conditions the cross section attains the Breit-Wigner form. In the opposite extreme of resonant states obeying nearly Dirichlet boundary conditions, the cross section attains becomes an inverted Breit-Wigner shape. These results naturally lead us to question the definition of resonance in terms of the scattering cross section.