

"Subbarrier fusion reactions with dissipative couplings"
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The coupled-channels approach, which takes into account the excitations of a few collective states in the colliding nuclei, has been successful in describing heavy-ion fusion reactions at subbarrier energies. However, in recent years, experimental data have accumulated that suggest a need to go beyond the conventional coupled-channels approach. In order to address the effect of single-particle excitations, that have been ignored in the conventional coupled-channels approach, on heavy-ion reactions, in this talk we will discuss the penetrability for a one dimensional two-level system in the presence of a coupling to dissipative environment described by a random matrix model. We will present the energy dependence of the Q-value distribution, and discuss how the barrier distribution is perturbed by the dissipative couplings. We will also discuss briefly the effect of single-particle excitations on scattering of identical nuclei as well as on heavy-ion fusion reactions at deep subbarrier energies.