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Random Matrix Theory Approach for Unstable Nuclei[1] GAVRIIL SHCHEDRIN, VLADIMIR ZELEVINSKY, Michigan State University — Random Matrix Theory as a statistical approach for exploring energy spectra of complex quantum systems was pioneered by Wigner and Dyson in 1950's. This theory was successfully applied to excited states of complex nuclei and other mesoscopic systems evaluating statistical fluctuations and correlations in energy levels and corresponding wave functions. The standard random matrix approach was formulated only for closed systems with no coupling to the outside world. Later it was generalized for decaying systems with energies of unstable states in the complex plane. Recent precise experiments showed that the neutron width distribution in low-energy neutron resonances cannot be described by the standard Porter-Thomas distribution that follows from standard random matrix theory. We analyze the combined distribution function of resonance widths and energies in an unstable quantum system that follows from the statistical assumptions which agree with the general quantum requirements, such as unitarity of the scattering matrix. We show that such statistical theory indeed leads to the trend observed experimentally.

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