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Resonance Width Distribution for Open Chaotic Quantum Systems GAVRIIL SHCHEDRIN[1], Michigan State University — Recent measurements of resonance widths, Γ, for low-energy neutron scattering off heavy nuclei claim significant deviations from the standard chi-square $\chi^2_1(\Gamma)$, or the Porter-Thomas, distribution. The unstable nucleus is an open quantum system, where the intrinsic dynamics has to be supplemented by the coupling of chaotic internal states through the continuum. We propose a new resonance width distribution based on the random matrix theory for an open quantum system. For a single open channel, the new distribution is $P(\Gamma) = C\chi^2_1(\Gamma)\sqrt{\sinh \kappa/\kappa}$ where $\kappa = \pi\Gamma/2D$ and D is the mean energy level spacing. This result naturally recovers the Porter-Thomas distribution for small κ and can be directly applied to a whole range of mesoscopic systems, and is invariant under $\Gamma \to \eta - \Gamma$, whereη is the total width. The realistic situation in nuclei is not that of a single neutron channel. Many photon channels are always opened which modifies the width distribution into $P(\Gamma, \gamma) = C\chi^2_1(\Gamma - \gamma)\sqrt{\sinh \kappa_\gamma/\kappa_\gamma}$ with $\kappa_\gamma = \pi(\Gamma - \gamma)/2D$, and the whole distribution is shifted by γ, an average radiation width.

[1]The work is done together with Prof. Vladimir Zelevinsky, Michigan State University.

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