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Neutron width statistics in a realistic resonance-reaction model[1]

PAUL FANTO, Yale University, GEORGE BERTSCH, University of Washington and Institute for Nuclear Theory, YORAM ALHASSID, Yale University — The statistical model of compound nucleus reactions is widely used in nuclear science, astrophysics, and nuclear technology. A recent experiment [1] found that the distributions of reduced neutron widths for Pt isotopes deviate from the Porter-Thomas distribution (PTD). This finding contradicts the statistical model expectation, and several explanations have been proposed [2-4]. We have studied resonance width statistics for s-wave neutron scattering off ^{194}Pt within a model that combines the statistical description of the compound nucleus with a realistic description of the neutron channel [5]. We find that the reduced neutron width distribution agrees with the PTD for a large range of the model parameters, if the energy dependence of the average neutron widths is correctly described. We identify a parameter range where a near-threshold bound or virtual state of the neutron channel distorts the average neutron width [2], leading to apparent PTD violation if the usual analysis is used. [1] P.E. Koehler *et al*, PRL **105**, 072502 (2010) [2] H.A. Weidenmüller, PRL **105**, 232501 (2010) [3] G.L. Celardo *et al*, PRL **106**, 042501 (2011) [4] A. Volya *et al.*, PRL **115**, 052501 (2015) [5] P. Fanto, G.F. Bertsch, and Y. Alhassid, arXiv:1710.00792

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