Contribution ID: **49** Type: **not specified**

BARBARA DIETZ: Quantum Chaotic Scattering Experiments with Microwave Billiards, Random Matrix Theory and their Application to Nuclear Data

Wednesday, 19 February 2020 11:30 (1 hour)

I will speak about experiments with flat microwave resonators with and without induced time-reversal invariance violation. The scattering matrix formalism for such systems is equivalent to that developed for the random matrix theory description of compound nuclear reactions. Accordingly, the extraordinary advantage of such experiments is that they render possible the experimental verification of a variety of statistical measures for the fluctuation properties in the spectra of the associated scattering matrix and thus the development of tools for the characterization of nuclear spectra. Recently, we validated analytical expressions for the distribution of the off-diagonal cross sections based on these microwave data and then
applied them to excitation functions of the compound-nuclear reaction 37 Cl(p,a) 34 S.
Furthermore, we studied the fluctuation properties in the energy spectra of 208 Pb. High resolution experiments have recently lead to a complete identification of the energy values,
spin, and parity of 151 nuclear levels. We analyzed their fluctuation properties using random matrix theory and also the method of Bayesian inference. The talk basically reviews the
results published in [1-5].

This work was supported by the Deutsche Forschungsgemeinschaft (DFG) within the
Collaborative Research Center 643 and 1245. BD thanks the NSF of China for financial
support under Grant Nos. 11775100 and 11961131009.

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Session Classification: PLENARY TALKS

Track Classification: SYMPOSIUM ON SCATTERING, QUANTUM AND CLASSICAL TRANSPORT