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Distribution of level spacing ratios in random matrix theory and quantum chaotic systems: variants and applications

Abstract: Quantum chaotic systems are usually characterized by the distribution of energy level spacings, which can be understood in the framework of random matrix theory. Recently, the distribution of level spacing ratios has gained popularity in the study of few-body as well as many-body systems owing to its ease of computation. In this talk, a few variants of the spacing ratios will be discussed. In particular, analytical and numerical results for spacing ratios as applied to mixed systems (i.e. systems that are not fully chaotic), as well as higher-order ratios will be introduced. Finally, their applications will be demonstrated in disparate complex quantum systems including quantum billiards, spin chains and experimentally measured nuclear resonances.