Quantum chaos, eigenvalue statistics and the Fibonacci sequence

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One of the outstanding insights in the field of "Quantum Chaos" is a conjectural description of local statistics of the energy levels of simple quantum systems according to crude properties of the dynamics of classical limit, such as integrability, where one expects Poisson statistics, versus chaotic dynamics, where one expects Random Matrix Theory statistics. These insights were obtained by physicists in the last quarter of the 20-th century. However, mathematicians are far behind in understanding the scope and validity of this theory. The first part of the lecture will be dedicated to an introduction to these conjectures. In the second part, I will describe more recent work on statistics of the minimal gap between the eigenvalues for one such simple integrable system, a rectangular billiard having irrational squared aspect ratio. When the aspect ratio is the "golden ratio", the problem involves some curious and entertaining properties of the Fibonacci sequence.

Monday, September 23, 2019 04:00pm - 05:00pm

Raiffeisen Lecture Hall, Central Building

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