Quantum Chaos and Atom Optics: From Experiments to Number Theory

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Host: Denis Ullmo

Abstract: Resonances are among the most typical manifestations of quantum mechanical behavior and are very sensitive to values of parameters (for example in standard atomic spectroscopy). Recently resonances, that are stable with respect to variation of parameters, were discovered experimentally for the dynamics of laser cooled Cesium atoms when driven in the presence of gravity. A theoretical explanation of this surprising observation will be presented. Further theoretical predictions that were verified experimentally will be presented as well. In particular it is found that the experimental results depend the number theoretical properties of the values of parameters. The theory makes use of invariance properties of the system, that are similar to the ones of solids, as well as of the theory of dynamical systems.