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Title: Length spectrum of smooth convex billiards

Abstract: Given a (convex) billiard table, we record the lengths of all periodic orbits in a set called the "Length spectrum"; we can then ask how much of the Geometry of the domain is encoded in the Length Spectrum. This question is tightly related to the analogous question for the Spectrum of the Laplace operator, that is known as "Can one hear the shape of a drum?".

It is known that a marking of the length spectrum (i.e., knowing "which" orbit corresponds to "which" length) allows to gather lots of dynamical information (e.g., Lyapunov exponents of periodic orbits and, in some cases, the whole geometry of the domain). To which extent can such results be obtained without a marking? Does the length spectrum has any structure that can be used to recover a marking?

In this talk I will show some evidence that this task can be quite
complicated: we construct (a dense set of) smooth billiard domains with a very degenerate (uncountable) Length Spectrum.