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Hyperbolic cone surfaces and polygonal billiards

Consider a polygon-shaped billiard table in the hyperbolic plane on which a ball can roll along geodesics and reflect off of edges infinitely. In joint work with Viveka Erlandsson and Chris Leininger, we have characterized the relationship between the shape of the polygon and the set of possible sequences of edges visited consecutively by billiard balls rolling and reflecting around the polygon. In order to do this, we made an arguably more interesting characterization: when a hyperbolic metric with cone points on a surface is determined by the geodesics that do not pass through cone points. In this talk, we will explore these characterizations and the tools used to prove them.