



The Institute of Mathematical Sciences
The Chinese University of Hong Kong

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Joint Harvard-CUHK-YMSC
Differential Geometry Seminar
**Birkhoff's conjecture on integrable
billiards and Kac's problem
"hearing the shape of a drum"**

Abstract: Billiards on an elliptical billiard table are completely integrable: phase space is foliated by invariant submanifolds for the billiard flow. Birkhoff conjectured that ellipses are the only plane domains with integrable billiards. Avila-deSimoi-Kaloshin proved the conjecture for ellipses of sufficiently small eccentricity. Kaloshin-Sorrentino proved local results for all eccentricities. On the quantum level, the analogous conjecture is that ellipses are uniquely determined by their Dirichlet (or, Neumann) eigenvalues. Using the results on the Birkhoff conjecture, Hamid Hezari and I proved that for ellipses of small eccentricity are indeed uniquely determined by their eigenvalues. Except for disks, which Kac proved to be uniquely determined, these are the only domains for which it is known that one can hear their shape.

By

Professor Steve Zelditch

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Date: March 16, 2022 (Wednesday)
Time: 9:30am – 10:30am (Hong Kong Time)
Zoom Link: <https://cuhk.zoom.us/j/97001510671>
(Meeting ID: 970 0151 0671; Passcode: 20220316)

All are Welcome