MATH-IMS Joint Pure Mathematics Colloquium Series
The Chinese University of Hong Kong

This Colloquium Series in Pure Mathematics is organized by the Department of Mathematics and the Institute of Mathematical Sciences (IMS) at The Chinese University of Hong Kong. The series focuses on all areas of pure mathematics together with theoretical developments and applications.

Date: October 21, 2021 (Thursday)
Time: 10:00-11:00 (Hong Kong Time)
Zoom Link: https://cuhk.zoom.us/j/98846779826

Periodic Floer homology and surface dynamics

Speaker: Professor Dan Cristofaro-Gardiner
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Abstract: Periodic Floer homology (PFH) is an algebraic invariant associated to area-preserving surface diffeomorphisms. Lee and Taubes have shown that PFH is isomorphic to a version of Seiberg-Witten Floer homology, and so PFH links topology and dynamics in a novel and fruitful way. We recently used this bridge to settle several longstanding problems in surface dynamics. I will explain a bit about the ideas for this in the case of two of these problems: our resolution of the Simplicity Conjecture, which states that the group of compactly supported area-preserving homeomorphisms of the two-disc is not simple; and our resolution of a version of the smooth closing lemma, which implies that a generic smooth area-preserving diffeomorphism of a closed surface has a dense set of periodic points. A kind of Weyl law recovering the classical Calabi invariant from the asymptotics of PFH plays a key role in both proofs. These are joint works with Seyfaddini and Humiliere in the first case, and Prasad and Zhang in the second.

Bio: Prof. Cristofaro-Gardiner received his Ph.D degree from UC Berkeley in 2013. After which he became a member at the Institute of Advanced Study from 2013 to 2014. From 2014 to 2017 he has been a Benjamin-Peirce fellow and a NSF postdoc fellow at Harvard University. From 2016 to 2021 he was an assistant professor at University of California, Santa Cruz. This fall he moved to University of Maryland as an assistant professor. Prof. Cristofaro-Gardiner was twice awarded the Institute for Advanced Study Von Neumann Fellowship; he was awarded Fondation Sciences Mathématiques de Paris Distinguished Professor Fellowship and the IMJ-PRG Fellowship in 2017.