

WOLFF MEMORIAL LECTURE SERIES



May 12–14, 2025
4-5PM



Linde Hall
Room 310

with **Dr. Assaf Naor**
Princeton University



“Distortion growth”

It is typically impossible to embed with finite distortion an infinite metric space X of interest, such as most finitely generated groups equipped with their word metric, into a “nice” metric space Y , such as a Hilbert space. In those common situations, one of the most pertinent and useful questions becomes determining the asymptotic growth rate of the smallest $D=D(n)$ such that every n -point subset of X embeds into Y with distortion D . This talk will explain the geometric and analytic challenges that this question leads to, its rich history, including both major past achievements and very recent progress, as well as longstanding mysteries that remain elusive despite investigations over many decades. No background will be assumed beyond undergraduate mathematics.

May 12, 2025
4-5PM



Parking: Parking is available in Lot 3 (underground parking #126 on campus map) on California Blvd. between Wilson and Arden (near the tennis courts). Scan the QR code for a map with directions for getting to Linde Hall.

Questions? Please email mathinfo@caltech.edu or call 626-395-4335

“From distortion growth to isoperimetry, and back again”

There are many situations in which understanding distortion growth is deeply related to a range of isoperimetric questions, from continuous settings to discrete and algorithmic issues. We will see how the Sparsest Cut problem, which is a central open question in approximation algorithms, relates to distortion growth. We will describe how this link led over 3 decades of intensive research to a resolution of a major question about the performance of a well-studied algorithm for Sparsest Cut, with the final step occurring a few months ago. During those decades of work, this endeavor featured multiple twists and turns that benefited both computer science and pure mathematics, exhibiting deep interactions with areas such as geometric measure theory, harmonic analysis, probability, combinatorics, group theory, functional analysis, complexity theory and algorithm design. We will explain these developments and their ramifications, including the recently demonstrated extremal property of the observable diameter of the Euclidean sphere.

May 13, 2025
4-5PM

“Random zero sets”

This self-contained talk will focus on a concept that has a central role in the proofs of results that were described in the previous two talks, including the most recent progress, though it could be understood and appreciated on its own without knowledge of the content of the previous two talks. A random zero set is a distribution over random subsets of a given metric space that has the following paradoxical-sounding property: with a fixed definite positive probability, for every two points in the metric space, one of those points belongs to the random subset and the other one is far from the random subset. We will explain how such objects occur, how they can be used and what they are good for, and discuss how they can be constructed, thus leading to fine structural information about a large and useful class of metric spaces.

May 14, 2025
4-5PM