

Math/Stat Colloquium



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How Big Can It Be? Some Challenges of Size in Fourier Analysis

In this talk I will discuss a few problems of quantifying the notion of size in the mathematical area of Fourier analysis. The fundamental issue is that in essentially any sufficiently complex system, there are multiple "natural" ways to understand or quantify the notion of size. This leads to a never-ending series of questions in comparing different notions, like: does largeness in one sense always lead to largeness in the other sense? The main part of the talk will be about the Kakeya Needle Problem, which examines whether sets which are large enough to move a needle-shaped object around in must also be large in the usual sense of area. This problem has an interesting and satisfying solution, but is also intimately connected to a host of open questions, large and small, in Fourier analysis. As time permits, we will explore connections to geometric nonconcentration inequalities, which are a general framework for figuring out how to define largeness of sets so that it corresponds with whatever geometric properties that you find interesting.

Tuesday, October 8th

SC 199, Refreshments 4:15pm, Lecture 4:30pm