SEAM 2015 – The 31st Southeast Analysis Meeting

March 8-10, 2015

Abstracts for Plenary Talks

Marianna Csörnyei
University of Chicago

Tangents of sets and differentiability of functions I & II

Abstract

One of the classical theorems of Lebesgue tells us that Lipschitz functions on the real line are differentiable almost everywhere. We study possible generalisations of this theorem and some interesting geometric corollaries.

Ciprian Demeter
Indiana University

The discrete restriction phenomenon

Abstract

We will investigate the Fourier restriction associated with lattice points on the sphere, with both number theory and incidence geometry methods.

Ciprian Demeter
Indiana University

Decouplings, Strichartz estimates and the Lindelof hypothesis

Abstract

We introduce a new method for estimating a wide range of exponential sums, that relies entirely on Harmonic Analysis. Applications to PDEs and Number Theory will be discussed, such as the Strichartz estimates on the higher dimensional torus and improved estimates for the growth of the Riemann zeta function on the critical line. Joint work with Jean Bourgain.

Brett Wick
Georgia Institute of Technology

The Linear Bound for Matrix A_2 Weights I & II

Abstract

In this series of talks we will discuss recent results related to the norm of Calderon-Zygmund operators acting on vector-valued spaces normed by a matrix A_2 weight.

Lillian Pierce
Duke University
Bringing the Carleson operator out of Flatland

Abstract

Must the Fourier series of an L^2 function converge pointwise almost everywhere? In the 1960's, Carleson answered this question in the affirmative by studying a particular type of maximal singular integral operator that has since become known as a Carleson operator. In the past 40 years, a number of important results have been proved for generalizations of the original Carleson operator. In this talk we will introduce the Carleson operator and survey several of its generalizations, and then describe new joint work with Po-Lam Yung (Chinese University of Hong Kong) that introduces curved structure to the setting of polynomial Carleson operators.

Joshua Zahl
Massachusetts Institute of Technology
An improved bound on the Hausdorff dimension of Kakeya sets in $\mathbb{R}^3$

Abstract

I will discuss an improved bound for the Hausdorff dimension of a Kakeya set in $\mathbb{R}^3$. In 2000, Katz, Laba, and Tao proved that every Kakeya set in $\mathbb{R}^3$ must have upper Minkowski dimension at least $5/2 + \epsilon$, where $\epsilon > 0$ is a small absolute constant. I will discuss a similar bound, except upper Minkowski dimension is replaced by Hausdorff dimension. Katz, Laba and Tao achieved their bound by showing that a (hypothetical) 5/2-dimensional Kakeya set must have several structural properties, which they called planiness, graininess, and stickiness. Our new Hausdorff dimension bound does not use these properties. Instead, it uses Bourgain's discretized sum-product theorem. This is joint work with Nets Katz.