

## **The helicoidal method**

Camil Muscalu

Cornell University, Department of Mathematics

Title: The helicoidal method

Abstract: "The plan of the talk is to describe (some of) our recent joint work with Cristina Benea, on what we like to call "the helicoidal method", a new, and extremely efficient iterative technique, for proving (multiple) vector valued inequalities and also sparse domination in harmonic analysis".

## On analytic properties of complex and imaginary multiplicative chaos

Eero Saksman

University of Helsinki, Department of Mathematics and Statistics

Title: 'On analytic properties of complex and imaginary multiplicative chaos'

Abstract: ' We consider random complex multiplicative chaos " $e^{\beta X}$ " for general log-normal Gaussian fields and  $\beta \in \mathbb{C}$ . In particular, we will describe analytical properties of " $\cos(\beta X)$ ". The talk is based on joint work with Janne Junnila (University of Helsinki) and Christian Webb (Aalto University).'

# DEGENERATE POINCARÉ-SOBOLEV INEQUALITIES: RECENT RESULTS

CARLOS PÉREZ

University of the Basque Country and BCAM- Basque Center for Applied Mathematics

Title: "Degenerate Poincaré-Sobolev inequalities: recent results"

In this lecture I plan to discuss some recent results obtained with E. Rela concerning Poincaré and Poincaré-Sobolev inequalities with weights. These results improve some classical estimates due to Fabes-Kenig-Serapioni obtained in the 80's in connection with the local regularity of weak solutions of degenerate elliptic equations. We will also show that the failure of the Poincaré inequalities for  $A_\infty$  weights or even to the reverse Holder class  $RH_\infty$  is connected to the failure of Poincaré inequalities when  $p < 1$ . Finally we will apply extrapolation type theorems in the context of Poincaré inequalities.

## **Bloom type inequality in the bi-parameter setting**

Kangwei LI

BCAM-Basque Center for Applied Mathematics

Title: Bloom type inequality in the bi-parameter setting.

Abstract: Bloom type inequality, which is a two weight inequality for commutators, has been well understood in the one-parameter case in the last few years. In a recent paper, Holmes, Petermichl and Wick extended this topic to the bi-parameter setting. However, they didn't provide any information for the iterated commutators. In a recent joint work with Henri Martikainen and Emil Vuorinen, we significantly simplify the proof for the non-iterated case, and also provide the related results for arbitrary order of commutators. We remark that, even in the unweighted case, the boundedness of iterated commutators of bi-parameter singular integrals are new (previously there were some partial results, concerning the paraproduct free case)