

Harmonic Analysis and the Self-Improving Property of Poincaré Inequalities

Carlos Perez Moreno

BCAM and Universidad del Pais Vasco - Spain

In this lecture, we will show how to use Real Analysis methods to give new proofs of fundamental estimates, such as the Poincaré-Sobolev or Trudinger inequalities avoiding the classical subrepresentation formulas. The basic theme is the self-improving property of generalized Poincaré type inequalities. This approach is more flexible but also produces more precise estimates, particularly when dealing with singular measures. We will outline some old results which can be improved in modern ways which include fractional type results improving some celebrated results by Bourgain-Brezis-Mironescu.

In Special Session 43 on Harmonic Analysis and Partial Differential Equations at the Mathematical Congress of the Americas 2025.