Math 295 - Mathematics Colloquium

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Decoupling and applications

Abstract:
Decoupling is a Fourier analytic tool that has repeatedly proved its extraordinary potential for a broad range of applications to number theory (counting solutions to Diophantine systems, estimates for the growth of the Riemann zeta), PDEs (Strichartz estimates, local smoothing for the wave equation, convergence of solutions to the initial data), geometric measure theory (the Falconer distance conjecture) and harmonic analysis (the restriction conjecture). The abstract theorems are formulated and proved in a continuous framework, for arbitrary functions with spectrum supported near curved manifolds. At this level of generality, the proofs involve no number theory, but rely instead on wave packet analysis and incidence geometry related to the Kakeya phenomenon. The special case when the spectrum is localized near lattice points leads to unexpected solutions of conjectures once thought to pertain to the realm of number theory.

Host: Ioan Bejenaru

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