In this talk I will review some results in connection with the so-called David-Semmes problem about Riesz transforms and rectifiability and other related questions. In particular, I will also talk about a recent joint result with Jaye, Nazarov and Reguera regarding the comparability of the squared $L^2$ norm of the Riesz transform of a measure and some Wolff type energy in the case of non-integer codimension smaller than 1.

Harmonic measure and rectifiability for domains with porous boundary

In this talk I will describe a recent joint result with Jonas Azzam and Mihalis Mourgoglou regarding the rectifiability of harmonic measure on some domains with finite Hausdorff $n$-dimensional surface measure in $\mathbb{R}^{n+1}$. The relationship between Riesz transforms and rectifiability plays a key role in the arguments.