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Aula T2 (UB).

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**Riesz transforms and rectifiability in codimension 1.**

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**ABSTRACT:**

In the early 90's David and Semmes asked if the  $L^2$  boundedness of the  $n$ -dimensional Riesz transform with respect to an  $n$ -dimensional AD-regular measure in  $\mathbb{R}^d$  implies its uniform rectifiability. In 1996, the case  $n = 1$  was solved in the affirmative by Mattila, Melnikov and Verdera by using the connection between the Cauchy kernel and the notion of curvature of measures. For other values of  $n$  the problem has remained open up to now, because of the lack of any connection between Riesz transforms and any notion such as curvature.

In this talk I will explain a recent joint result with F. Nazarov and A. Volberg where we answer affirmatively the David-Semmes question in the codimension 1 case. I will try to explain some of the ideas from the proof, which involve quasiorthogonality methods, mass transportation type estimates, variational techniques, and a deep criterion of David-Semmes for uniform rectifiability. Our result has also some nice consequences for the characterization of removable singularities for Lipschitz harmonic functions.