

# SEMINARIO DE ANÁLISIS Y APLICACIONES

Jueves, 20 de junio de 2019

Aula Gris 1 (ICMAT)

**11:00 h. Marius Mitrea**, University of Missouri-Columbia

## Singular Integrals and Flatness

### Resumen:

The theory of singular integral operators originally initiated by by A.P. Calderon and A. Zygmund in the 1950's continues to expand, with geometric questions taking center stage at the moment. From the seminal work of G. David and S. Semmes in the 1990's we now know that uniform rectifiability is the most natural geometric conditions ensuring boundedness on  $L_p$  spaces. For a variety of purposes it is of interest to understand not just when the norm of such singular integral operators is finite but rather when the said norm is actually small. This lecture elaborates on the specific analytic and geometric features which determine the latter aspect. One of the main results identifies the largest class of singular integral operators (dubbed "generalized double layers") which have small norms as mappings on Lebesgue, Sobolev, Hardy, BMO, and Holder spaces considered on sufficiently flat "surfaces". This is based, in part, on joint work with Juan Jose Marin, Jose Maria Martell, Dorina Mitrea, and Irina Mitrea.

**12:15 h. Dorina Mitrea**, University of Missouri-Columbia

## Boundary Problems in Infinitesimally Flat Uniformly Rectifiable Domains

### Resumen:

In this talk I will discuss boundary value problems for second-order elliptic constant (complex) coefficient systems in open subsets of the Euclidean ambient satisfying certain geometric properties, best expressed in the language of Geometric Measure Theory. One of the most prominent features is the smallness of the BMO semi-norm of the outward unit normal, which should be thought as some scale-invariant demand of flatness (this does not force the boundary to be regular as, in fact, this may contain spiral points, for example). In this geometric environment we are going to formulate both Dirichlet and Neumann Problems, and prove existence, uniqueness, estimates, and integral representation formulas for their respective solutions. This relies on work in collaboration with Juan Jose Marin, Jose Maria Martell, Irina Mitrea, and Marius Mitrea.