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Date and place: May 3, 16.00, Scuola Normale Superiore, Aula Tonelli

Title: *Kakeya singular integral operators and quantitative estimates for Lagrangian flows with BV vector fields*

Abstract: In this talk, we introduce a Kakeya singular integral operator and establish a weak type $(1,1)$ bound for this operator. We then apply it to solve a main open problem mentioned in [L. Amborosio and G. Crippa, 2014]. Specifically, we prove the well posedness of regular Lagrangian flows associated to vector fields

$$B = (B^1, \ldots, B^d) \in L^1((0,T); L^1 \cap L^\infty(\mathbf{R}^d))$$

representable as

$$B^i = \sum_{j=1}^m \mathbf{K}_j^i * b_j, \qquad b_j \in L^1((0,T), BV(\mathbf{R}^d))$$

with $\mathrm{div}(B) \in L^1((0,T); L^\infty(\mathbf{R}^d))$, where $(K_j^i)_{i,j}$ are singular kernels in $\mathbf{R}^d$.