ON THE CONVERSE OF RADEMACHER THEOREM AND THE RIGIDITY OF MEASURES IN LIPSCHITZ DIFFERENTIABILITY SPACES

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Rademacher Theorem asserts that every Lipschitz function is differentiable almost everywhere with respect to the Lebesgue measure. Results in this spirit have been established by Pansu in Carnot groups and by Cheeger in abstract metric measure spaces. A natural question is then the rigidity of those measures for which every Lipschitz function is differentiable almost everywhere.

Aim of the talk is to discuss this issue in increasing generality. In particular we will present a proof of the fact that Rademacher Theorem can hold for a measure if and only if it is absolutely continuous with respect to the Lebesgue measure. The theorem is based on a new structural result for measures satisfying a PDE constraint.

We will also show some consequences of this fact concerning the structure of measures in Lipschitz differentiability spaces and discuss some ongoing work concerning the converse of Pansu Theorem.