On the converse of Pansu's differentiability theorem

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In this talk I will present two new results concerning differentiability of Lipschitz maps between Carnot groups. The former is a suitable adaptation of Pansu-Rademacher differentiability theorem to general Radon measures. More precisely we construct a suitable bundle associated to the measure along which Lipschitz maps are differentiable, very much in the spirit of the results of Alberti-Marchese. The latter is the converse of Pansu's theorem. Namely, let G be a Carnot group and μ a Radon measure on G. Suppose further that every Lipschitz map between G and H, some other Carnot group, is Pansu differentiable μ-almost everywhere. We show that μ must be absolutely continuous with respect to the Haar measure of G. This is a joint work with Guido De Philippis, Andrea Marchese, Andrea Pinamonti and Filip Rindler.

This new sub-Riemannian result will be an excuse to present and discuss the techniques employed in Euclidean spaces to prove the converse of Rademacher's theorem.