

Regularity Results for Double Phase Problems on Metric Measure Spaces

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In this talk, we present boundedness, Hölder continuity and Harnack inequality results for local quasiminima to elliptic double phase problems of p -Laplace type in the general context of metric measure spaces. The proofs follow a variational approach, based on the De Giorgi method and a careful phase analysis. The main novelty is the use of an intrinsic approach, based on a double phase Sobolev-Poincaré inequality. This is a joint project, together with Prof. Dr. Antonella Nastasi from the University of Palermo. During the past two decades, a theory of Sobolev functions and first degree calculus has been developed in this abstract setting. A central motivation for developing such a theory has been the desire to unify the assumptions and methods employed in various specific spaces, such as weighted Euclidean spaces, Riemannian manifolds, Heisenberg groups, graphs, etc. Analysis on metric spaces is nowadays an active and independent field, bringing together researchers from different parts of the mathematical spectrum. It has applications to disciplines as diverse as geometric group theory, nonlinear PDEs, and even theoretical computer science. This can offer us a better understanding of the phenomena and also lead to new results, even in the classical Euclidean case.

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