

CLASSIFICATION RESULTS, RIGIDITY THEOREMS AND SEMILINEAR PDES ON RIEMANNIAN MANIFOLDS: A P-FUNCTION APPROACH

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ABSTRACT. We consider solutions to critical and sub-critical semilinear elliptic equations on complete, noncompact Riemannian manifolds and study their classification as well as the effect of their presence on the underlying manifold. When the Ricci curvature is non-negative, we prove both the classification of positive solutions to the critical equation and the rigidity for the ambient manifold. The same results are established for solutions to the Liouville equation on Riemannian surfaces. Our results are obtained via an appropriate P-function whose constancy implies the classification of both the solutions and the underlying manifold. The analysis carried out on the P-function also makes it possible to classify non-negative solutions for subcritical equations on manifolds enjoying a Sobolev inequality and satisfying an integrability condition on the negative part of the Ricci curvature. This is a joint work with Alberto Farina e Camilla Chiara Polvara.