

# Nonlinear subelliptic problems involving operators with non standard growth

Patrizia Pucci

Dipartimento di Matematica e Informatica

Università degli Studi di Perugia

Email: patrizia.pucci@unipg.it

ABSTRACT: Recently, the study of nonlinear problems involving critical nonlinearities has attracted increasing attention in the context of stratified groups: the geometric analysis in the Heisenberg group and, more generally, in the sub-Riemannian manifolds is currently one of the most active and exciting mathematical areas. We present existence results for nonlinear problems involving subelliptic operators of Marcellini's type, with critical nonlinearities. As far as we know, the existence results represent one of the first attempts in the literature to set such general critical elliptic equations in the context of stratified groups.

In the first part of the talk, we consider operators with  $(p, q)$  growth, when both the exponents are strictly less than the homogeneous dimension  $Q$ . Then, we also show existence results for problems involving critical exponential nonlinearities when  $q = Q$ . In this case, a "double absence of compactness" appears in the critical nonlinearities, which now involve also singular coefficients. This study is strongly motivated by physical applications in molecular physics, quantum cosmology and linearization of combustion models. However, the extension to this general context and the presence of critical nonlinearities require several delicate estimates and techniques to deal with, in order to overcome the lack of compactness.

The results of the talk are obtained in papers, written jointly with *L. Temperini*.