

ABSTRACTS

Speaker: Daniele Cassani

Title: Maximum Principle for higher order operators: a tribute to Patrizia Pucci

Abstract: We discuss a general principle of perturbing higher order operators with lower order derivatives in order to restore the maximum principle in the framework in which it is well known to fail. This is somehow delicate and the main ingredient is a new Harnack-type inequality. We first prove De Giorgi type level estimates for functions in, $W^{1,t}$ with $t > 2$. This augmented integrability enables us to establish a new Harnack type inequality for functions which do not necessarily belong to De Giorgi's classes as obtained by Di Benedetto-Trudinger for functions in $W^{1,2}$. As a consequence, we prove the validity of the strong maximum principle for uniformly elliptic operators of any even order, in fairly general domains and in any dimension, provided either lower order derivatives or inertial effects are taken into account.

Speaker: Giovanni Molica Bisci

Title: Some minimax results for nonsmooth functionals in the Calculus of Variations

Abstract: In the last years, elliptic equations involving a nonsmooth term have attracted several outstanding mathematicians and the interest towards this kind of problems has grown more and more, not only for their intriguing analytical structure, but also in view of their applications in a wide range of contexts. Motivated by this wide interest in the literature, the leading purpose of this talk is to present some recent results on nonsmooth elliptic equations, mainly related to a wide class of functionals defined through multiple integrals of Calculus of Variations. Applications to quasilinear boundary value problems will be presented and some open problems briefly discussed; see [AMS] and Chapter 8 in [MBP] for related topics.

[AMS] C. Alves, G. Molica Bisci, and S. da Silva, *New minimax theorems for lower semicontinuous functions and applications*, ESAIM: Control, Optimisation and Calculus of Variations. DOI: <https://doi.org/10.1051/cocv/2024005> (in press).

[MBP] G. Molica Bisci and P. Pucci, *Nonlinear Problems with Lack of Compactness*, De Gruyter Series in Nonlinear Analysis and Applications **36** (2021), i+vii, 1--266.

Speaker: Nikolaos Papageorgiou

Title: Singular Perturbation of a Double Phase Eigenvalue Problem

Abstract: We consider a Dirichlet problem driven by the double phase operator and a reaction that has the combined effects of a singular term and of a parametric superlinear perturbation. Using variational tools and critical groups we prove an existence and multiplicity result which is global in the parameter.

Speaker: Vicentiu Rădulescu

Title: to be announced

Speaker: Marco Rigoli

Title: Rigidity of static perfect fluid spacetimes

Abstract: In recent years there has been an increasing activity on manifolds with special metrics such as Ricci solitons, Mean curvature flow solitons, Vacuum static spaces and so on. In the present seminar we shall consider Static perfect fluid spacetimes coming from General Relativity modeling "galaxies in the universe". In fact we generalize our point of view by adding an interacting non-linear field to the model. We focus on a warped Lorentzian metric, reduce the problem to Riemannian geometry and study rigidity in this latter ambient. Our main technical tools to obtain our results are integral formulas and the maximum principle. This work is written in collaboration with L. Branca, G. Colombo and P. Mastrolia.

Speaker: Simone Secchi

Title: Some recent results on semilinear elliptic equations on Cartan-Hadamard manifolds

Abstract: I will present some existence results on semilinear elliptic equations on Cartan-Hadamard manifolds obtained in collaboration with Luigi Appolloni (Leeds, UK) and Giovanni Molica Bisci (Urbino, Italy).

Speaker: Raffaella Servadei

Title: Fractional problems with lack of compactness

Abstract: Critical problems are particularly relevant for their relations with many applications where a lack of compactness occurs. The fractional Laplacian operator appears in concrete applications in many different fields. This is one of the reason why, recently, nonlocal fractional problems are widely studied in the literature. Aim of this talk is to discuss some recent results about existence and multiplicity of solutions for fractional nonlocal equations with critical growth assumptions on the nonlinear term.

Speaker: Letizia Temperini

Title: On a class of local and nonlocal nonlinear subelliptic problems

Abstract: Motivated by important applications to geometric control theory and CR geometry, recently great attention has been devoted to the study of nonlinear problems and geometric inequalities in the Heisenberg group. In this talk we present some results related to the critical Sobolev embedding in the Heisenberg group. Due to the lack of compactness, suitable extensions of the concentration-compactness principle of P.L. Lions are proved in the homogeneous setting for Folland-Stein spaces and for fractional horizontal Sobolev spaces. The results of the talk are based on joint works with M. Piccinini (Univ. Pisa) and G. Palatucci (Univ. Parma) and with P. Pucci (Univ. Perugia).

Speaker: Vincenzo Vespri

Title: A survey about anisotropic operators

Abstract: In this note, we aim at drawing a coherent, guide of the state-of-the-art on the theory of basic regularity, such as local boundedness, local Hölder continuity, Harnack estimates and some of their consequences, in the context of solutions to anisotropic p -Laplacian operators, elliptic and parabolic.