Book of Abstracts

Running START in Analysis

Università della Campania "L. Vanvitelli", Caserta

16-17 April, 2024

Federico Cacciafesta
Università degli Studi di Padova

Title: Dispersive properties of the Dirac equation
Abstract: In this talk, I shall review the main dynamical properties of the linear Dirac equation, discussing in particular the validity of linear estimates (time decay, Strichartz, local smoothing) and comparing them with the ones for the Schrödinger equation. Time permitting, we shall see how these estimates are affected by the presence of external potentials (electric or magnetic).

Francesca Colasuonno
Alma Mater Studiorum Università di Bologna

Title: Multiplicity and symmetry breaking for supercritical elliptic problems
Abstract: In this talk, I will present an existence result for the Dirichlet problem associated with the elliptic equation

$$-\Delta u + u = a(x)|u|^{p-2}u$$

set in an annulus or an exterior domain of $\mathbb{R}^N$, $N \geq 3$. Here $p > 2$ is allowed to be supercritical in the sense of Sobolev embeddings, and a is a positive weight with additional symmetry and monotonicity properties. In the special case of radial weight a, such an existence result ensures the multiplicity of nonradial solutions.

This is joint work with Alberto Boscaggin (Università di Torino), Benedetta Noris (Politecnico di Milano) and Tobias Weth (Goethe-Universität Frankfurt).

Pier Domenico Lamberti
Università degli Studi di Padova

Title: On the superposition and the Phragmén-Lindelöf principles for the p-Laplacian
Abstract: We present a version of the Phragmén–Lindelöf comparison principle for equations involving the p-Laplacian on exterior domains, with a negative potential and $p \geq 2$, and we apply it to prove upper and lower estimates for sub and super-solutions in the case of Hardy-type potentials. Our method is based on a novel superposition principle for the p-Laplacian. Based on a joint work with Vitaly Moroz.

Francesco Leonetti
Università degli Studi dell'Aquila

Title: Elliptic systems and double phase functionals
Abstract: It is well known that solutions to elliptic systems may be unbounded. Nevertheless, for some special classes of systems, it can be proved that solutions are bounded. We mention a recent result of this kind and we discuss some examples suggested by double phase functionals.

Henrique M. Oliveira
Universidade de Lisboa

Title: Analysis of Synchronized States in Three Coupled Oscillators via Nonlinear Dynamics
Abstract: This talk presents an investigation into the synchronization of three identical oscillators, emphasizing the role of small impacts in pairwise oscillator interactions. We demonstrate that the system achieves synchronization with a constant phase difference between consecutive oscillators. The analysis reveals that these synchronized states form an attractor with a basin encompassing the closure of entire space of initial conditions. Our methodology involves the construction of a two-dimensional nonlinear discrete dynamical system, relevant to a variety of weakly coupled periodic oscillators under symmetric mutual impacts. The discussion extends to the examination of oscillation amplitude variations in the synchronized state, specifically within the framework of interacting Andronov pendulum clocks, providing detailed insights into amplitude changes in the locked state. Joint work with Emma D'Aniello.

Maria Michaela Porzio
Università di Roma "Sapienza"

Title: The role of the data on the regularity of the solutions to some evolution equations
Abstract: In this talk we discuss the influence of the initial data and the forcing terms on the regularity of the solutions to a class of evolution equations including as model cases linear and semilinear parabolic equations together with the nonlinear p-Laplacian equation. We focus our study to the regularity (in terms of belonging to appropriate Lebesgue spaces) of the gradient of the solutions. We will prove that there are cases where the regularity of the solutions as soon as $t > 0$ is not influenced at all by the initial data. We also derive estimates for the gradient of these solutions which are independent of the initial data and reveal, once again, that for this class of evolution problems the real "actor of the regularity" are the forcing terms.

Antonio Vitolo
Università degli Studi di Salerno

Title: Existence of entire solutions vanishing at infinity by positive drift
Abstract: We discuss the existence of solutions, defined in the whole space and vanishing at infinity, of fully nonlinear second-order elliptic equations. The result is based on a variant of the Alexandroff - Bakelman - Pucci estimate, independent of the geometry and the size of the domain, which relies on a "positive" drift rather than on a suitable decay rate of the drift at infinity.