EDP e Dintorni XI:
Eleventh Meeting around PDE

Department of Mathematics
University of Bari Aldo Moro
May 18-19, 2026

Speakers

Stefano Biagi (*Politecnico di Milano*)
Felisia Angela Chiarello (*Libera Università Mediterranea*)
Piero D'Ancona (*Sapienza University of Rome*)
Serena Federico (*Alma Mater Studiorum University of Bologna*)
Vincenzo Ferone (*University of Naples Federico II*)
Alessia Kogoj (*University of Urbino Carlo Bo*)
Dario Daniele Monticelli (*Politecnico di Milano*)
Angela Pistoia (*Sapienza University of Rome*)
Hiroyuki Takamura (*Tohoku University*)
Dimiter Vassilev (*University of New Mexico*)
Paolo Ventura (*École Polytechnique Fédérale de Lausanne*)

Organizers
Marcello D'Abbicco (*University of Bari*)
Annunziata Loiudice (*University of Bari*)
Sandra Lucente (*University of Bari*)
Alessandro Palmieri (*University of Bari*)

Program

	Mon 18
14:45	Registration
15:00	**OPENING**
15:10	Ventura
15:45	D'Ancona
16:20	**COFFEE BREAK**
16:45	Takamura
17:20	Monticelli
17:55	Chiarello

	Tue 19
9:00	Ferone
9:35	Vassilev
10:10	Federico
10:45	**COFFEE BREAK**
11:10	Pistoia
11:45	Kogoj
12:20	Biagi
12:55	**CLOSING**

Titles and abstracts

Stefano Biagi

A Liouville-type property for degenerate-elliptic equations modeled on Hörmander vector fields

We obtain Liouville-type theorems for degenerate elliptic equation with a drift term and a potential, of the form

$$\mathcal{L}u = \sum_{i=1}^{m} X_i^2 u + \sum_{i=1}^{m} b_i(x) X_i u - Q(x)u = 0 \quad \text{in } \mathbb{R}^n,$$

where $X = \{X_1, \dots, X_m\}$ is a family of smooth Hörmander vector fields which are homogeneous with respect to a family of non-isotropic dilations, but *are not necessarily left-invariant with respect to any Lie-group structure on* $\mathbb{R}^n$. We show that the conditions imposed on the coefficients of the operator are optimal. Indeed, when these assumptions fail, we prove the existence of infinitely many bounded solutions.
This is a joint work with D.D. Monticelli and F. Punzo.

Felisia Angela Chiarello

Well-posedness and singular limit for a nonlocal GARZ model

We will analyze the nonlocal version of the so-called Generalized Aw-Rascle-Zhang model (GARZ), consisting of two conservation laws with nonlocality in the flux. The nonlocality is in convolution form. We will prove the existence, uniqueness and stability of weak solutions, and we will study the singular limit, i.e. the convergence of the solution of the nonlocal problem to that one of the corresponding 'local' problem, obtained as limit of the convolution kernel tending to a Dirac delta.

Piero D'Ancona

Uniform Resolvent Estimates for Schrödinger operators

A classical result due to Kenig, Ruiz and Sogge, states that the resolvent operator for the Euclidean Laplacian $(-\Delta - z)^{-1}$ is bounded from Lp to Lq for a certain range of indices p,q. The operator norm depends on the frequency z, as dictated by scaling, and it is actually independent of z for suitable values of p and q, hence the 'uniform' tag. In view of their applications to Spectral Theory, Harmonic Analysis and Nonlinear PDEs, it is interesting to extend these estimates to more general operators beyond the Laplacian. In this joint work with Zhiqing Yin we consider a general electromagnetic Laplacian and, under suitable decay assumptions on the potentials, we recover the same range of indices as in the free case. As an application, we deduce a 'magnetic' restriction estimate of Tomas-Stein type.

Serena Federico

Smoothing estimates for third order equations with variable coefficients

In this talk we shall discuss the validity of smoothing estimates for some third order space-variable coefficient equations of KdV-type in any space dimension. As an application of the smoothing estimates, we will give a local well-posedness result for the nonlinear initial value problem associated with the class of operator under consideration.

Vincenzo Ferone

First eigenvalue and torsional rigidity: isoperimetric inequalities for the fractional Laplacian

We present a fractional counterpart of a generalized Kohler-Jobin inequality, showing that, among all bounded, open sets $\Omega \subset \mathbb{R}^N$ with Lipschitz boundary, having the same fractional torsional rigidity, the first Dirichlet eigenvalue $\lambda_1(\Omega)$ of the fractional Laplacian attains its minimum on balls. With the same arguments we also establish a reverse Hölder inequality for an eigenfunction corresponding to $\lambda_1(\Omega)$. The results have been obtained in collaboration with B. Brandolini, I. de Bonis, G. Piscitelli and B. Volzone.

Alessia Kogoj

Liouville theorems for left-invariant PDEs via right-invariant derivatives

It is well known that harmonic functions with finite energy are constant. We show how this result extends to partial differential operators that are left-invariant with respect to a Lie group law on $\mathbb{R}^n$. This approach yields several interesting consequences depending on the class of operators under consideration. We apply our results to the sub-Laplacian and the heat operator on the Heisenberg group, Kolmogorov–Fokker–Planck-type operators, the relativistic Kolmogorov operator, and the Mumford operator.

Dario Daniele Monticelli

Rigidity and classification results for some critical elliptic and degenerate elliptic equations

In this talk I will present some recent results on rigidity and Liouville-type phenomena for positive solutions to some classical nonlinear elliptic equations with critical growth. I will also briefly discuss extensions to degenerate problems in the subriemannian setting, where similar rigidity and classification results occur. The results are joint works with G. Catino (Politecnico di Milano), Y.Y. Li (Rutgers University) , A. Roncoroni (Politecnico di Milano) and X. Wang (Michigan State University).

Angela Pistoia

The Brezis–Nirenberg Problem: Classical and Recent Results

In this talk, I will present an overview of both classical results and more recent developments concerning the well-known Brezis–Nirenberg problem. After recalling the main framework and the key difficulties related to the presence of the critical exponent, I will discuss fundamental contributions in the literature as well as some current research directions, with particular emphasis on the analytical techniques involved and on a number of still open problems.

Hiroyuki Takamura

The effect of the initial moment on non-autonomous semilinear wave equations in two space dimensions

In this talk, I will present a new phenomenon of a prototype model of non-autonomous semilinear wave equations in two space dimensions. For the initial value problem of autonomous equations with small data of compact support, we have two kinds of lifespan estimate of the solution when the nonlinear power is less than or equal to 2. Such a classification depends on the 0th moment of the initial speed. Our new model has weighted nonlinear terms by one of the characteristic variables which produces many classifications of the lifespan estimate according to the moment of the initial data with higher degree. This is joint work with M. Kato (Univ. of Hyogo, Japan) and K. Wakasa (Muroran Inst. Tech., Japan).

Dimiter Vassilev

Regularity of Solutions to Non-Local nonlinear equations on Homogeneous Groups

The focus is on properties of solutions to a non-local version of the p-Laplacian equation in the setting of homogeneous groups without assuming Hörmander's finite rank condition. The main results are the Hölder continuity and the validity of Harnack's inequality enjoyed by weak solutions.

Paolo Ventura

Benjamin-Feir instability of Stokes waves

I will present the modulational instability of a special class of traveling solutions of the water waves equations, known as Stokes waves. This phenomenon had long been predicted by physical experiments, starting with the pioneering work of T. Benjamin and J. Feir and by numerical simulations, but the rigorous mathematical theory was essentially limited to the local bifurcation of an unstable branch from the origin.
In particular, numerical evidence suggested that the continuation of this branch should form a figure-eight curve in the complex plane, and that infinitely many additional unstable branches of exponentially small size, called *isolas*, should appear along the imaginary axis. In this talk, I will explain how, using a symplectic version of Kato perturbation theory, one can give an analytic proof of this spectral picture.
The results presented in the talk were obtained in collaboration with M. Berti, L. Corsi, and A. Maspero.