# Young PDEs Meeting in Granada

13 June 2025

Instituto de Matemáticas, Universidad de Granada

## Conference Information

**Organizers:**
Laura Baldelli (University of Granada)
Rafael López Soriano (University of Granada)

**Invited speakers:**
Simone Ciani (University of Bologna)
Fabio De Regibus (University of Granada)
Umberto Guarnotta (Polytechnic University of Marche)
Francisco J. Reyes-Sánchez (University of Granada)

**Venue:** Seminario 2, IMAG, UGR

**Schedule:**

- 09:45–10:30 Umberto Guarnotta
- 10:30–11:00 Coffee break
- 11:00–11:45 Fabio De Regibus
- 11:45–12:30 Francisco J. Reyes-Sánchez
- 12:30–13:15 Simone Ciani

# Abstracts

## Simone Ciani (University of Bologna)

**Title:** Compactly Supported Evolution Vs Extinction - for a special non-Newtonian diffusion

**Abstract:** Non-Newtonian fluids exhibit diverse and very interesting behaviors. In this talk we will focus on power-like stress tensors, mainly addressing p-Laplacian-type scalar equations. What distinguishes singular and degenerate equations from the point of view of the properties enjoyed by their solutions? We will address this classic question and discuss the state of the art in the context of a more general non-Newtonian operator that interests each coordinate direction with preferred diffusion and, for this reason, inherited the epithet *anisotropic*.

## Fabio De Regibus (University of Granada)

**Title:** Rigidity results for finite energy solutions to 2D stationary Euler equations

**Abstract:** In this talk we present some rigidity results for finite energy solutions to the stationary 2D Euler equations. If the stagnation set is connected, we show that the stream function solves an autonomous semilinear elliptic equation. Moreover, if the vorticity does not oscillate near infinity we prove that the flow is radial.

Joint work with F. Esposito and D. Ruiz.

## Umberto Guarnotta (Polytechnic University of Marche)

**Title:** A p-laplacian problem in $\mathbb{R}^N$ with singular, convective, critical reaction

**Abstract:** The talk is devoted to the problem

$$\begin{cases} -\Delta_p u = \lambda w(x) f(u, \nabla u) + u^{p^*-1} & \text{in } \mathbb{R}^N, \\ u > 0 & \text{in } \mathbb{R}^N, \\ u(x) \to 0 & \text{as } |x| \to +\infty, \end{cases}$$

where $N \geq 2$, $1 < p < N$, and $\lambda > 0$. The nonlinear term $f : (0, +\infty) \times \mathbb{R}^N \to (0, +\infty)$ is a continuous function which is singular in the first variable and p-sublinear with respect to the second one. The weight $w : \mathbb{R}^N \to (0, +\infty)$ satisfies suitable summability and decay conditions. The problem exhibits several features:

- the perturbation $f$ is singular, i.e., it blows up when the solution vanishes;
- $f$ encompasses also convection terms, depending on the gradient of the solution;
- the dominating reaction term has critical growth;
- the setting is the whole $\mathbb{R}^N$;
- pointwise decay (at infinity) of the solutions is required.

We will present an existence result that combines variational methods, truncation techniques, and concentration compactness arguments, together with set-valued analysis and fixed point theory. In addition, De Giorgi's technique, gradient estimates, and nonlinear regularity theory will be employed to ensure local $C^{1,\alpha}$ regularity of solutions, as well as their pointwise decay at infinity, quantitatively estimated via blow-up arguments and a priori estimates.

Joint work with Laura Baldelli.

**Francisco J. Reyes-Sánchez (University of Granada)**

**Title:** Prescribing Gaussian and geodesic curvatures on bounded surfaces under singular conformal changes of the metric

**Abstract:** In this talk, we explore the problem of prescribing both the Gaussian and geodesic curvatures on a surface with conical singularities and corners through a conformal deformation of the metric. We establish conditions for the existence of such metrics by studying a nonlinear elliptic PDE, employing direct methods from the calculus of variations, blow-up analysis, and Morse index estimates. This is a work in collaboration with Luca Battaglia (Università di Roma Tre).

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**13rd June 2025**

**9:45 am, Seminario 2 (IMAG - UGR)**

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