INSALATE DI MATEMATICA



When Ellipticity Fails: Variational Problems Driven by the Grushin Operator

11/11/2026

Paolo Malanchini

University of Milano-Bicocca

IN THIS TALK

The Laplace operator is the standard uniformly elliptic operator. In this classical framework, we can easily recover smooth solutions and establish positivity via the strong maximum principle.But what happens when ellipticity fails?

In this talk, we explore nonlinear problems driven by a degenerate elliptic operator: the Grushin operator. We first employ variational tools, such as the Mountain Pass Theorem, to establish existence results for different Grushin problems. Then, we tackle the most delicate part: regularity theory. Unlike the uniformly elliptic case, we cannot expect smooth solutions. However, by using De Giorgi/Moser iteration schemes and Harnack inequalities, we can still recover global boundedness and Hölder continuity of the solutions.

🔑words: Grushin operator, variational methods, regularity theory

UNIVERSITÀ DEGLI STUDI DI MILANO BICOCCA

Dipartimento di Matematica e Applicazioni

"Obvious" is the most dangerous word in mathematics.
(Eric Temple Bell)

insalate.di.matematica

U9 - 05 📍
4:45 pm (CEST) 🕐