Schedule

4:00 - 4:30 p. m. Giampiero Palatucci, *Kinetic integral equations*

4:30 - 5:00 p. m. Francesca Anceschi, *Optimal control problems driven by nonlinear degenerate Fokker-Planck equations*

5:00 - 5:30 p. m. Letizia Temperini, *On the Trudinger-Moser embedding for fractional Sobolev-Slobodeckij spaces in the Heisenberg group*

5:30 - 6:00 p. m. Giulio Tralli, *Integral estimates for caloric functions via nonlinear and linear methods*

Kinetic integral equations

Giampiero Palatucci
Università di Parma

I will present some recent results in the spirit of the De Giorgi-Nash-Moser theory for weak solutions to a wide class of kinetic integral equations, where the diffusion term in velocity is an integro-differential operator having nonnegative kernel of fractional order with merely measurable coefficients. I will mainly focus on boundedness estimates and Harnack-type inequalities. The talk is based on a series of papers by Anceschi, Kassmann, Piccinini, Weidner and myself.

Optimal control problems driven by nonlinear degenerate Fokker-Planck equations

Francesca Anceschi
Università Politecnica delle Marche

In this talk we will analyse the well-posedness of a class of optimal control problems, where the state equation couples a nonlinear degenerate Fokker-Planck equation with a system of ODEs. This type of problem arises when dealing with mean-field limits of Stochastic Differential Models for multipopulation dynamics, where a large number of agents (followers) is steered through parsimonious intervention on a selected class of leaders. The results we will discuss about are part of a joint project in collaboration with G. Ascione, D. Castorina and F. Solombrino.

On the Trudinger-Moser embedding for fractional Sobolev-Slobodeckij spaces in the Heisenberg group

Letizia Temperini
Università Politecnica delle Marche

In this talk, we present results concerning the Trudinger-Moser embedding for fractional Sobolev-Slobodeckij spaces on the Heisenberg group $\mathbf{H}^n$. To establish the exponential integrability of functions in these spaces, we employ various tools, including a characterization of Sobolev-Slobodeckij spaces on $\mathbf{H}^n$ through interpolation. To extend the local inequality to a global setting, we develop a novel technique that circumvents the use of symmetrization, which is unavailable in this

context. Finally, we discuss Lions' concentration-compactness principle for these inequalities. This result significantly enhances the Trudinger-Moser inequality along specific sequences and has important applications in the study of PDEs with exponential nonlinearities, providing a crucial tool to address the challenges posed by the lack of compactness. The results presented are part of an ongoing joint work with G. Lu (University of Connecticut).

Integral estimates for caloric functions via nonlinear and linear methods

Giulio Tralli
Università di Ferrara

In this talk we first discuss classical derivative estimates for nonnegative solutions to the heat equation on convex domains: we focus on a modern approach which is nonlinear in spirit and it is based on the interplay between the Bernstein method and an adjoint method (based on a recent joint work with A. Goffi). Then, we turn the attention to degenerate parabolic equations of Kolmogorov type: in this setting such estimates for the solutions in the whole space can be derived by a direct potential approach, and with this in mind we focus on Poincaré-type inequalities for arbitrary smooth functions.