Applied and Computational Mathematics Seminar

Title: Modeling Dark Matter: a Dynamics Study

Speaker: Gaia Marangon (University of Padua)

Date: Wed 12th March 2025 at 10:00AM

Location: (See abstract)

Abstract: This seminar will take place in Science East E1.19.

Dark matter is one of the most fascinating open problems in modern astrophysics. Since it cannot be directly observed, modeling it requires a balanced mix of physical intuition, mathematical deduction, and comparison with indirect experimental data. In this talk, I will briefly introduce the physical context motivating my research, specifically the problem of dark matter distributions around galaxies. Starting from the Schrödinger-Poisson system, the most commonly used model for dark matter dynamics, I will outline the main directions my work has taken. I will focus on two key aspects. First, I will discuss the issue of stationary states, whose numerical study paves the way for comparison with experimental data. Then, I will propose a relativistic generalization of the model, the Klein-Gordon-Wave system. Its treatment by Hamiltonian perturbative techniques shows the potential of mathematical physics tools in building a comprehensive and reliable model.