Contribution ID: **8** Type: **not specified**

# Numerical optimal control of non-linear Fokker-Planck equations arising in social dynamics

*Wednesday, 11 February 2026 16:35 (25 minutes)*

We present a second-order numerical scheme to address the solution of optimal control problems constrained by the evolution of nonlinear Fokker-Planck equations arising from socio-economic dynamics. To design an appropriate numerical scheme for control realization, a coupled forward-backward system is derived based on the associated optimality conditions. The forward equation, corresponding to the Fokker-Planck dynamics, is discretized using a structure preserving scheme able to capture steady states.The backward equation, modeled as a Hamilton-Jacobi-Bellman problem, is solved via a semi-Lagrangian scheme that supports large time steps while preserving stability. Coupling between the forward and backward problems is achieved through a gradient descent optimization strategy, ensuring convergence to the optimal control. Numerical experiments demonstrate second-order accuracy, computational efficiency, and effectiveness in controlling different examples across various scenarios in social dynamics.

**Presenter:** CALZOLA, Elisa (University of Ferrara)