

# **Coupling Structure-Preserving and Semi-Lagrangian Schemes for Mean-Field Optimal Control**

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In this talk, we consider optimal control problems governed by nonlinear and nonlocal Fokker-Planck equations arising in mean-field models of collective dynamics. The associated first-order optimality conditions lead to a coupled forward-backward system consisting of a Fokker-Planck equation for the density and a Hamilton-Jacobi-type adjoint equation.

We approximate the forward problem using a second-order structure-preserving scheme and the backward equation with a second-order semi-Lagrangian method. The resulting solver is combined with a gradient-based optimization procedure and applied to mean-field models of opinion dynamics. Numerical experiments demonstrate the accuracy and effectiveness of the approach in steering the population towards prescribed configurations.