



ID de Contribution: 53

Type: **Professeur Invité**

From Theory to Engineer's Toolkit: Learning and Robust Control of Complex Nonlinear Systems (Master 3EA)

vendredi 3 juillet 2026 13:20 (20 minutes)

This project has a dual objective, combining teaching and research on machine learning methods for dynamical systems. It contributes to the teaching curriculum by offering students hands-on exposure to neural network tools for modeling and simulation of complex systems. The lectures introduce Physics-Informed Neural Networks (PINNs), providing Master students with concrete methods to embed physical laws and other structural properties directly into learning algorithms. Clara Galimberti will deliver 10 hours of lectures within the "GEP1185M: Intelligence Artificielle et analyse de données" UE of the M1 Master 3EA, and 2 hours of tutoring within the EEA Doctoral School on "Data-driven observer design."

From the research perspective, the project introduces an innovative framework for observer design and modeling complex dynamical systems, combining observer theory and machine learning. It employs PINNs to build Kazantzis–Kravaris–Luenberger (KKL) observers that map nonlinear dynamics into a contractive latent space. The same principles will support the construction of fast surrogate models for PDE-governed physical systems, leveraging PINNs and neural operators to efficiently capture multi-physics behaviors. The goal is to enable data-driven tools for control and simulation in complex industrial systems through stable, theory-grounded learned dynamics.

Master

EEEEA

Laboratoire d'accueil

LAGEPP

Composante ou Département Composante

GEP

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