MAX-PLANCK-INSTITUT
FÜR DYNAMIK KOMPLEXER
TECHNISCHER SYSTEME
MAGDEBURG

CSC Seminar

SPEAKER

Benedikt Brantner
MPI for Plasma Physics

TITLE

GeometricMachineLearning.jl: Structure-Preserving Neural Networks with Julia

ABSTRACT

In this talk we present GeometricMachineLearning.jl, a Julia package whose aim is the modeling of Hamiltonian and Lagrangian systems (mainly) with neural networks. The package contains tools for fitting Hamiltonian and Lagrangian flow maps to data coming from dynamical systems and performing structure-preserving reduced order modeling (ROM). Some of the network architectures implemented in the package, like symplectic neural networks (SympNets) and Hamiltonian neural networks (HNNs), are already established while others, like symplectic autoencoders (SAEs) and volume-preserving transformers (VPTs), were developed together with GeometricMachineLearning.jl and can only be found in this package. After a brief theoretical discussion of each of the network architectures we will show how to use them in Julia with short code snippets.

Tuesday, January 28, 2025 at 2 pm
seminar room Prigogine