STIVEN MASSALA

PhD candidate Machine Learning, Applied Mathematics and Computational Physics ◇

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RESEARCH FOCUS

PHD Thesis : Online construction of reliable Hybrid-AI models from deviation data and physics

What I do best is developping new predictive models to solve complex problems using computational mathematics and machine learning. My research lies in both deterministic and probabilistic context. My expected graduation date is november 2025.

EDUCATION

Doctor of Philosophy (PHD) **NTU Singapore**, , Dec 2022 - 2025
Domain : Machine Learning & Computational Physics
Supervisor : Massimo Picca Ciamarra (School of Applied Physics - SPMS)

Doctor of Philosophy (PHD) **Ecole Normale Superieure Paris-Saclay**, Dec 2022 - 2025
Domain : Machine Learning
Supervisor : Ludovic Chamoin (Laboratoire de Mecanique - LMPS)
Joint PHD with NTU Singapore, Auditor in MVA Msc 2022-2023

Master of Research in Applied Mathematics **CentraleSupelec**, Paris Saclay, France, 2020 - 2021
Fields of competence :
Functional analysis, Finite element method, Machine Learning,
Model order reduction, Wave propagation, Inverse problem, Numerical Analysis for ODEs and PDEs, Computational Algebra.

Diplome D'Ingenieur **Arts & Metiers ParisTech**, Lille, France 2017 - 2021
Fields of competence : Computational Mechanics, Material, Applied Physics, Optimization, Control

Bachelor in Financial Engineering **Paris Dauphine University**, France 2018 - 2019
Auditor(Year 3) : Portfolio Management,Econometrics, Microeconomics, Macroeconomics, International Economics

SKILLS AND INTERESTS

Software	[Python, MATLAB] (proficient)
Library	(Pytorch, Tensorflow, Jax, SKlearn), Slurm(Scheduling), Github (Version control)
Interests	Mathematical Modeling, Digital Twin, HPC, Machine Learning, Physics
Languages	French(native), English(fluent), Spanish(notions)

EXPERIENCES

Research Associate – CNRS@CREATE , Singapore June 2022 - November 2022

Developement of a full Finite Element Code in Matlab for partial differential equations discretization.

Developement of Reduced order model strategy using reduced basis technic and Proper orthogonal decomposition (POD)/PCA.

Developement of PINN(Physics Informed Neural Network) and Neural operators (Deeponets, FNO) for partial differential equations.

Development of bias-aware data assimilation strategies. Application to acoustic modeled by the Helmoltz equation
Supervisor : Ludovic Chamoin, Massimo Ciamarra.

Research Intern – Manchester University , UK Jan 2022 - Mar 2022

Development of Finite Element Method code for solid mechanics.
Supervisor : Dr Ajay Harish **Software** : Python.

Reseearch Intern – ANSYS , France, Villeurbanne April 2021 - October 2021

Development and Validation of a fully coupled Aerodynamics, Hydrodynamics and Multi-body dynamics simulation of Offshore Wind turbines.
Software : Ansys WB, Mechanical, Aqwa, SpaceClaim, Fluent, Visual Studio (C++, Python), Matlab.

Mechanical Engineer Intern – DL Flange , Houston, Texas. Nov 2019- July 2020

Finite element simulation for pipe flanges and flanged fittings.
Supervisor : Patrice Brossard

CONFERENCES PRESENTATION

Hybrid Physics-AI for efficient bias-aware state estimation : Workshop @ The Institute for Artificial Intelligence and Fundamental Interactions (IAIFI) **MIT**. Boston, USA 2024

Hybrid Physics-AI for efficient bias-aware state estimation : Workshop @SINFRA Workshop **NUS - A*STAR**, Singapore 2024

Coupling variational data assimilation and operator learning for effective state estimation on complex systems : 16th WCCM World Congress on Computational Mechanics and 4th Pan American Congress on Computational Mechanics. Vancouver, Canada 2024

Hybrid twins coupling PBDW and machine learning for effective state estimation on complex systems : 2nd IACM MMLDE-CSET, Mechanistic, Machine Learning and Digital Engineering for Computational Science Engineering & Technology. El paso, Texas, USA 2023

JOURNAL PAPER

Hybrid twin using PBDW and Neural Operator for the effective state estimation on complex systems [under review] 2024

WORKSHOP - SUMMER SCHOOL

Institute for Artificial Intelligence and Fundamental Interactions (IAIFI) Summer School @ **MIT** 2024

Fourth Symposium on Machine Learning and Dynamical Systems @ **Fields Institute** 2024

Model Reduction - Data assimilation **@ Isaac Newton Institute for Mathematical Sciences (Cambridge University)** 2023

Physics-Informed Neural Networks Summer School **@ KTH Royal Stockholm University**
Teachers : Georges Karniadakis & Khemraj Shukla 2023

Introductory Workshop for ASPIRE 2A @ **National Supercomputing Centre (NSCC) Singapore** 2023

Institute for Artificial Intelligence and Fundamental Interactions (IAIFI) Summer School @ **Northeastern University** 2022