

AI and the Uncertainty Challenge in Fundamental Physics

Introduction



David Rousseau (IJCLab) for the scientific
committee

ARTIFICIAL INTELLIGENCE AND THE UNCERTAINTY CHALLENGE IN FUNDAMENTAL PHYSICS

27 NOV - 1 DEC 2023

SCIENTIFIC COMMITTEE

Corentin Allaire
UCLab-Orsay

Olaf Behnke
DESY

Anja Butter
LPNHE-Paris

Sylvain Chevallier
LISN, Université Paris-Saclay

Valérie Gautard
CEA-Irfu Saclay

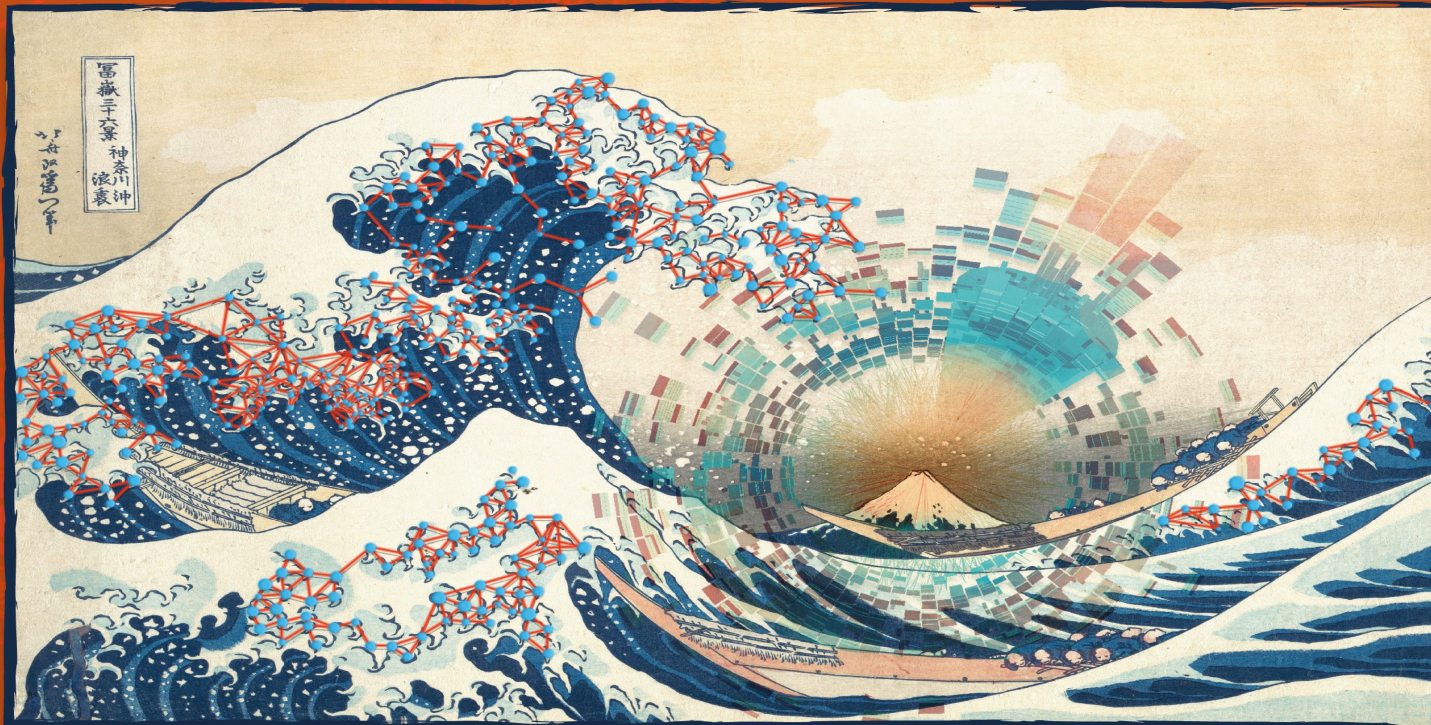
Louis Lyons
Imperial College & Oxford

David Rousseau
UCLab-Orsay

Jean-Roch Vlimant
CalTech

Thomas Vuillaume
LAPP, USMB, CNRS

Program Manager
Vincent Folliard
AISAI



UNCERTAINTY QUANTIFICATION
EXPLAINABLE/TRUSTWORTHY AI
DATA-FRUGAL/DATA-CENTRIC AI
SIMULATION-BASED INFERENCE,
UNFOLDING,...
ARCHITECTURES: ADVERSARIAL,
BAYESIAN,...
CONTROLLING UNCERTAINTIES
IN GENERATIVE MODELS
BENCHMARKS DATASET
AND CHALLENGES



[INDICO.IN2P3.FR/E/AIUPHYS2023](https://indico.in2p3.fr/e/aiuphys2023)

SCAI, PARIS AND INSTITUT PASCAL PARIS-SACLAY



AI S2AI
AI for science, science for AI

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AISSAI

Anomaly Detection Workshop



March 4-7, 2024

CLERMONT-FERRAND, FRANCE

Speakers

Mazen Alamir (GIPSA-lab, France)
Shikma Bressler (Weizmann, Israel)
Gregor Kasieczka (U. Hamburg, Germany)
Mikael Kuusela (CMU, USA)
Carole Lartizien (CREATIS, France)
Konstantin Malanchev (LINCC Frameworks/CMU, USA)

Scientific Organizing Committee

Vincent Barra (LIMOS) · Anja Butter (LPNHE) · Tommaso Dorigo (INFN) · Adnan Ghribi (GANIL) · Francois Lanusse (CEA)
Carole Lartizien (CREATIS) · Louis Lyons (Oxford) · Paula Sanchez (ESO) · Pietro Vischia (UniOvi and ICTEA)

Local Organizing Committee

Samuel Calvet · Alexandre Claude · Julien Donini · Cyril Galpier · Marine Hebert · Emille Ishida · Maria Pruzhinskaya

<https://indico.in2p3.fr/e/AISSAI2024>



<https://indico.in2p3.fr/event/30272/>

AISSAI Astroinfo hackathon

Fréjus, Jul 2023

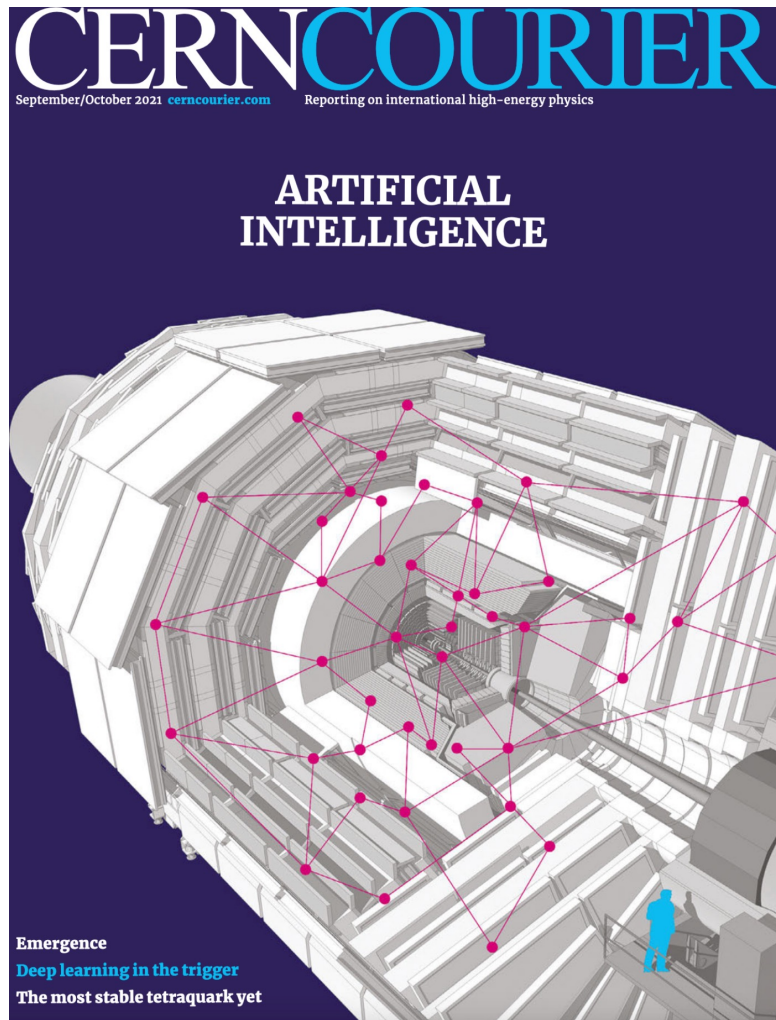


Outcome : 3 projects

- large language model for describing astro images
- diffusion model for image deconvolution
- galaxy classification model from star formation history embedding

<https://aissai-hackathon.astroinfo.in2p3.fr>

<https://github.com/astroinfo-hacks>



AISSAI Heterogeneous data

Toulouse

end spring 2024

OnBoardingSchool : Introduction à l'apprentissage automatique

9–13 Oct 2023
IJCLab
Europe/Paris timezone

Enter your search term

Overview

Timetable

Intervenants

Registration

Participant List

Venir à IJCLab

Comité d'organisation

✉ onboardingschool@ijcla...

Présentation

L'apprentissage automatique est la partie de l'intelligence artificielle qui se fonde sur des modèles mathématiques pour permettre aux ordinateurs d'apprendre et d'effectuer des tâches à partir de données. L'objectif principal de cette école est de présenter les concepts généraux d'apprentissage automatique (Machine Learning -ML- et Deep Learning -DL-) et de définir ses domaines et conditions d'application à travers des cas concrets. Cette école est financée par le projet AISSAI (Artificial Intelligence for Science and Science for Artificial Intelligence) du CNRS.

Objectifs

A l'issue de la formation, les participants seront en mesure :

- d'identifier la nature d'un problème d'apprentissage automatique : supervisé / non-supervisé, classification / régression
- de comprendre les concepts mathématiques des méthodes classiques de ML et de DL
- de mettre en œuvre les méthodes répandues de ML (SVM, arbres de décision, ...)
- de mettre en œuvre une architecture simple de réseaux de neurones (Perceptron MultiCouche et Réseau de Convolution)
- de connaître les principaux algorithmes du DL
- d'évaluer les performances de ces méthodes à travers plusieurs métriques
- de savoir interpréter les résultats des algorithmes et identifier leurs limites
- d'utiliser les outils Sklearn, Keras / Tensor Flow

La semaine sera organisée sous forme d'alternance de cours théoriques et de TPs sur ordinateur.

AISSAI Onboarding school

IJCLab 9-13 oct 2023

<https://indico.ijclab.in2p3.fr/event/9597/>

AISSAI Quantum ML focused week

Proposal: In the context of the AISSAI machine learning semester, we propose a collaboration between [AISSAI](#) and the [Cosmostatistics Initiative \(COIN\)](#). The goal is to organise a highly focused work meeting where participants will **study applications of quantum machine learning techniques to one real scientific problem.**



Foreseen in June 2024

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27 NOV - 1 DEC 2023

富嶽千波濤 神奈川 浪裏

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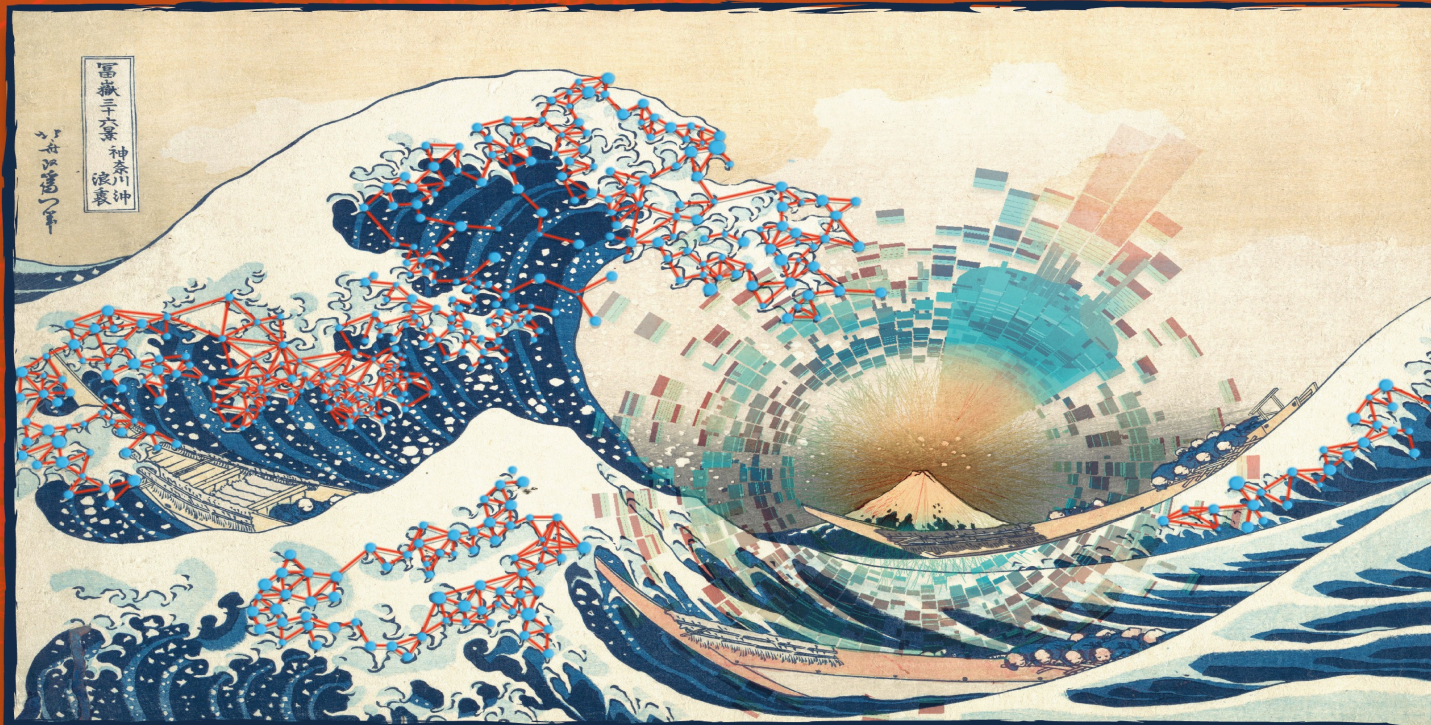
Thomas Vuillaume

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AISSAI



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- ❑ Jean-Roch Vlimant (CalTech)
- ❑ Thomas Vuillaume (LAPP-Annecy)

- ❑ Vincent Folliard program manager at AISSAI

Program



(all slides available before talks on indico agenda)

- ❑ Monday PM : Opening session, Uncertainty Quantification
- ❑ Tuesday AM : Explainable AI
- ❑ end of Tues AM, Tuesday PM : Simulation-Based Inference
(we switch to Institut Pascal Paris-Saclay)
- ❑ Wednesday AM : Data frugal approaches, Data-centric AI
- ❑ End of Wed AM : Benchmarks dataset and challenges
- ❑ Wednesday PM : Fair Universe hackathon
- ❑ Thu AM Unfolding / de-biasing
- ❑ End of Thu AM, Thu PM Controlling uncertainties in generative models
- ❑ Fri AM Architectures
- ❑ Fri PM Closing session
- ❑ Summary of AISSAI Machine Learning Assisted Sampling (Wed AM)
- ❑ Summary of AISSAI Thematic Quarter on Causality (Fri PM)

Social Events

- ❑ Lunch buffet every day (except Monday)
- ❑ Welcome cocktail 6PM today

- ❑ Workshop dinner Thursday 7PM Brass & co
 - Sold out !
 - Waiting list
 - If registered and changed your mind, please un-tick your registration on the agenda, so that your seat can be reallocated

slack

- ❑ Primary channel of communication
- ❑ Make sure you're connected (ask your neighbour)
- ❑ #general : for announcements
- ❑ #organisers_open : practical issues
- ❑ #random : tourism, outing, whatever.g.
- ❑ Use slack for scientific exchanges, one channel per session :
#sci_<n>_<session name>

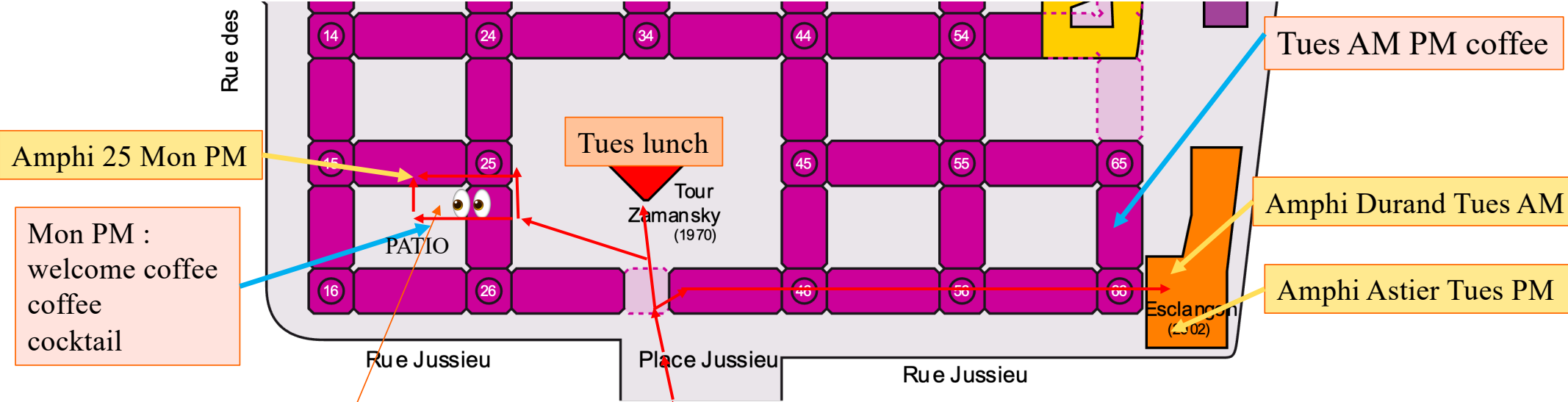
The screenshot displays the Slack interface for the workspace 'AIUPHYS2023'. The left sidebar lists various channels, with '#général' selected. The main content area shows the '#général' channel with a search bar at the top. A notification banner reads 'Vous regardez le canal #général' with a description: 'C'est le seul canal où tout le monde se retrouve. C'est l'endroit idéal pour faire des annonces et mener vos conversations d'équipe. Modifier la description'. Below this are buttons for 'Ajouter des collègues' and 'Transférer les e-mails sur ce canal'. The message history shows a timestamp '22 nov. à 20 h 30 min 52 s' and a message from David Rousseau: 'a rejoint #général. D'autre part, Ragansu Chakkappai et 18 autres personnes l'ont rejoint.' Below this is a message from Thomas Vuillaume: 'Bonjour à tous !' with 3 reactions. Another message from David Rousseau: 'Welcome ! We'll start at 2PM in Amphi 25, with coffee available from 1PM in the Patio. Directions in <https://indico.in2p3.fr/event/30589/page/3556-venue-accommodation-and-social-events>'. A link to 'IN2P3 Events Directory (Indico)' is also present, followed by a snippet of text: 'Artificial Intelligence and the Uncertainty challenge in Fundamental Physics. The workshop is organised by CNRS AISSAI and CNRS IN2P3. The integration of Artificial Intelligence (AI) into the realm of fundamental science is witnessing an unprecedented surge. However, there are specific challenges to be overcome: any measurement or prediction has to be provided with a precise confidence interval. Measurements rely on numerous inputs, each with inherent uncertainties and

Zoom



- ❑ Zoom in meeting mode (no waiting room, everyone sees every one else connection)
 - Link, meeting ID and code distributed on slack
 - Please do not advertise beyond workshop and conference
- ❑ Zoom chat (volatile) only to be used for connection issues
- ❑ Raise hand before asking your question
- ❑ Talks will be recorded through zoom, and uploaded on indico agenda (and possibly on a future AISSAI YouTube channel)

AI and the Uncertainty Challenge in Fundamental Physics : Monday, Tuesday plan



Mon PM :
welcome coffee
coffee
cocktail

Amphi 25 Mon PM

Tues lunch

Tues AM PM coffee

Amphi Durand Tues AM

Amphi Astier Tues PM

PATIO



Metro Jussieu

<https://maps.app.goo.gl/gQdNGVgfHfoVUcdBA>

Sponsors

