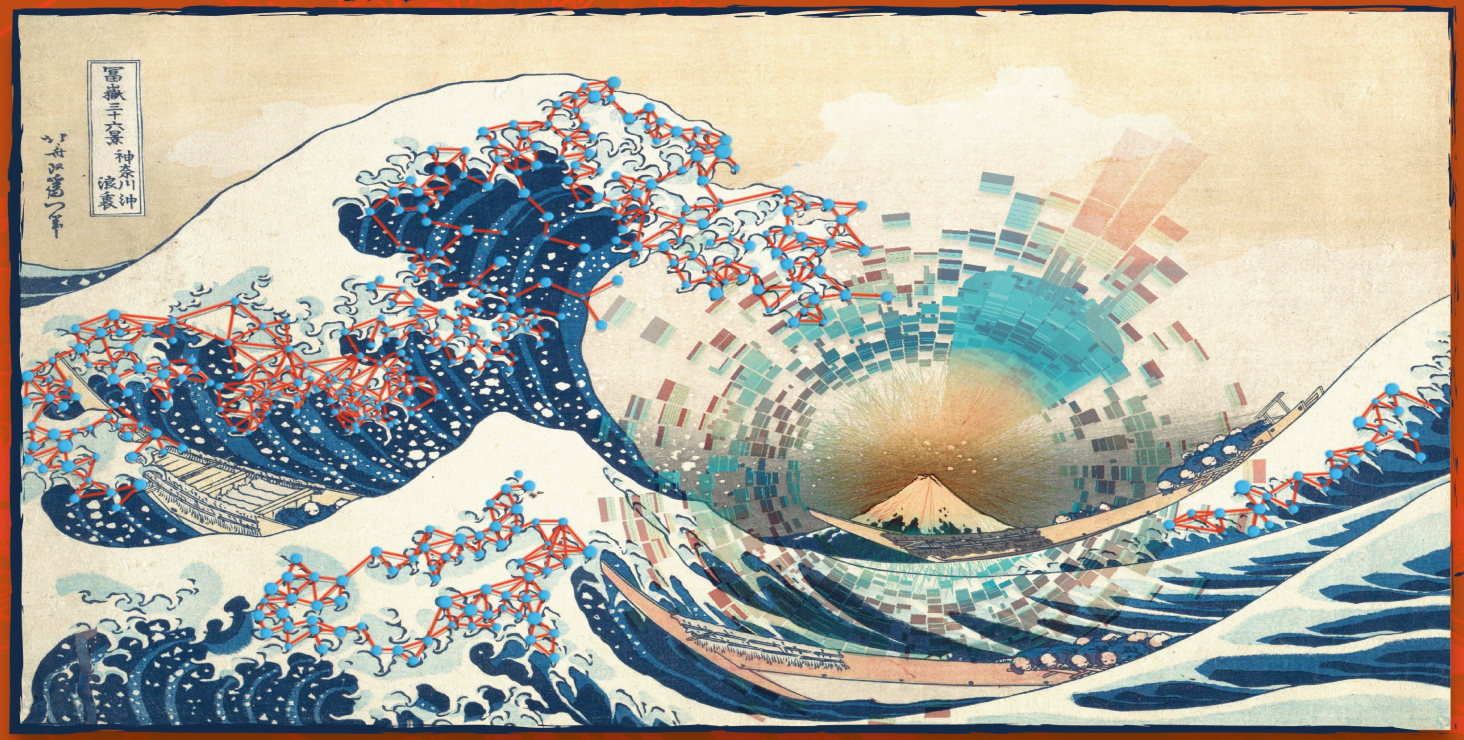
AI and the Uncertainty Challenge in Fundamental Physics

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
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Jean-Roch Vlimant
CalTech

Thomas Vuillaume
LAPP, USMB, CNRS

Program Manager
Vincent Folliard
AISSAI

- 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

AI S2AI
AI for science, science for AI

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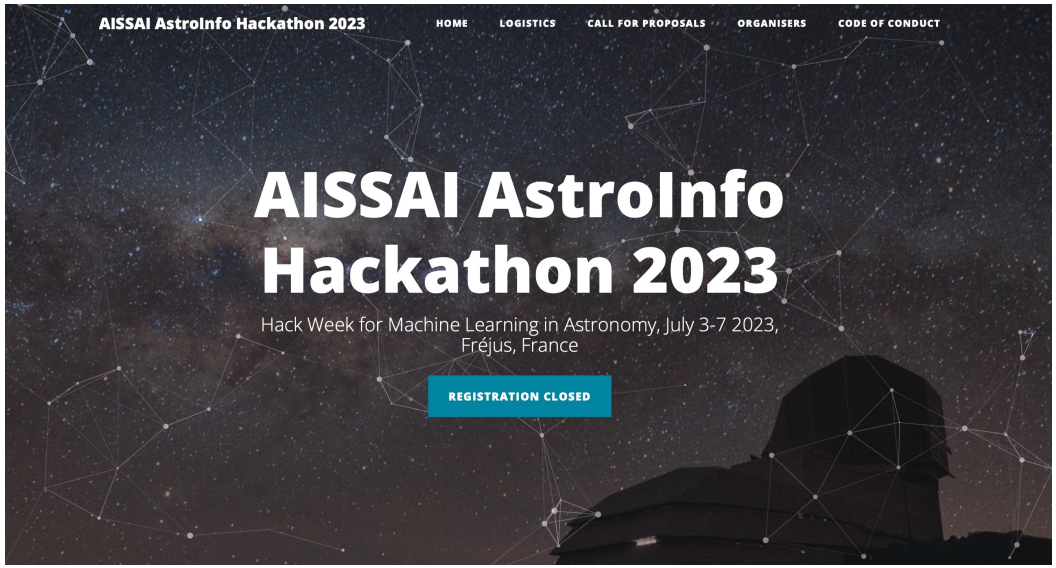
SCAI, PARIS AND INSTITUT PASCAL PARIS-SACLAY

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

AISSAI Astroinfo hackathon

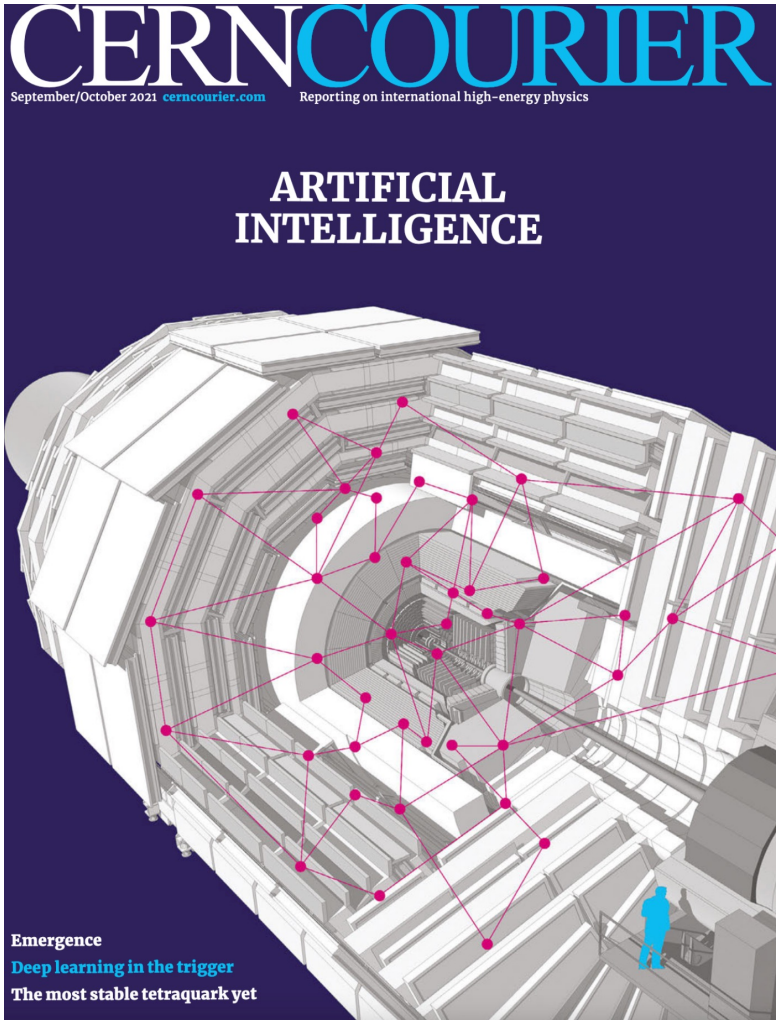
Fréjus, Jul 2023



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

AISSAI Onboarding school

IJClab 9-13 oct 2023

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

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 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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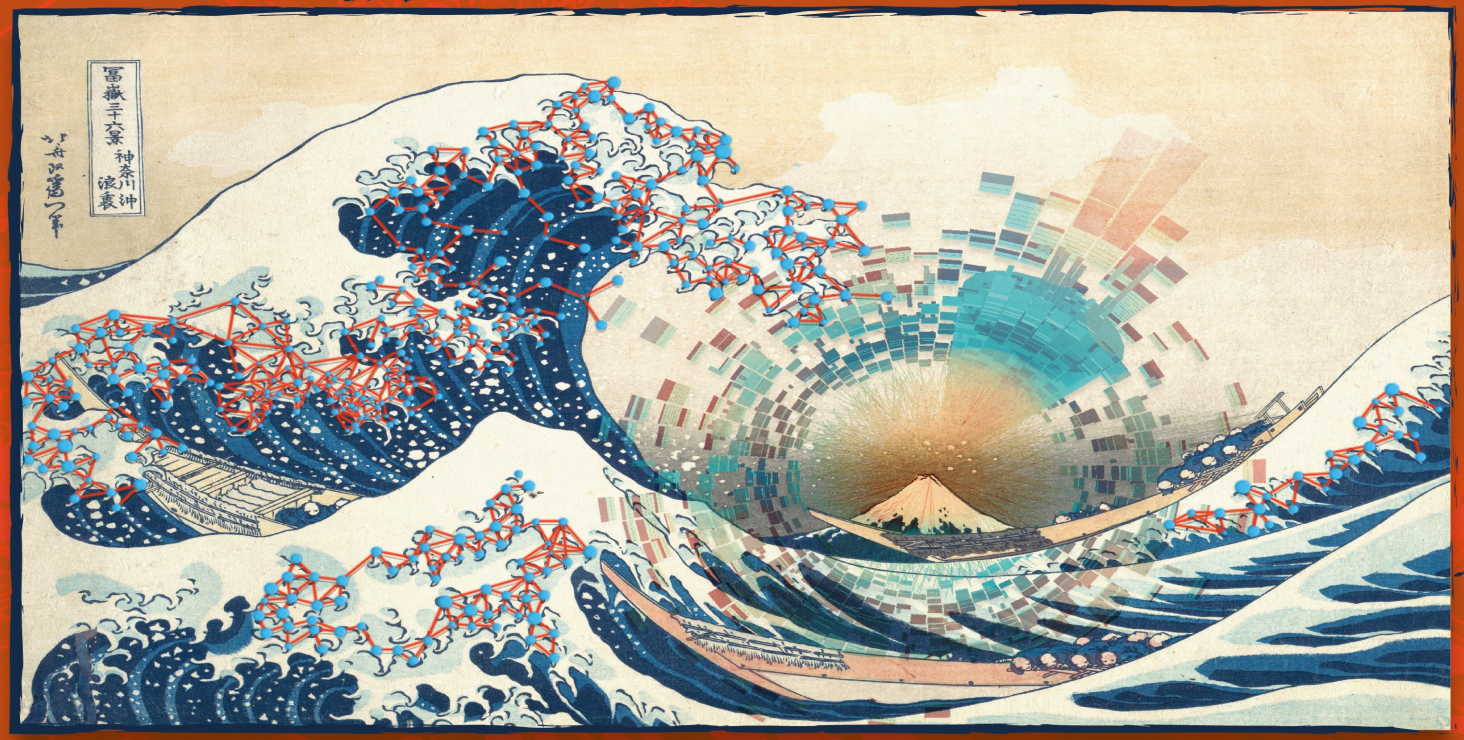

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SCAI, PARIS AND INSTITUT PASCAL PARIS-SACLAY

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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)

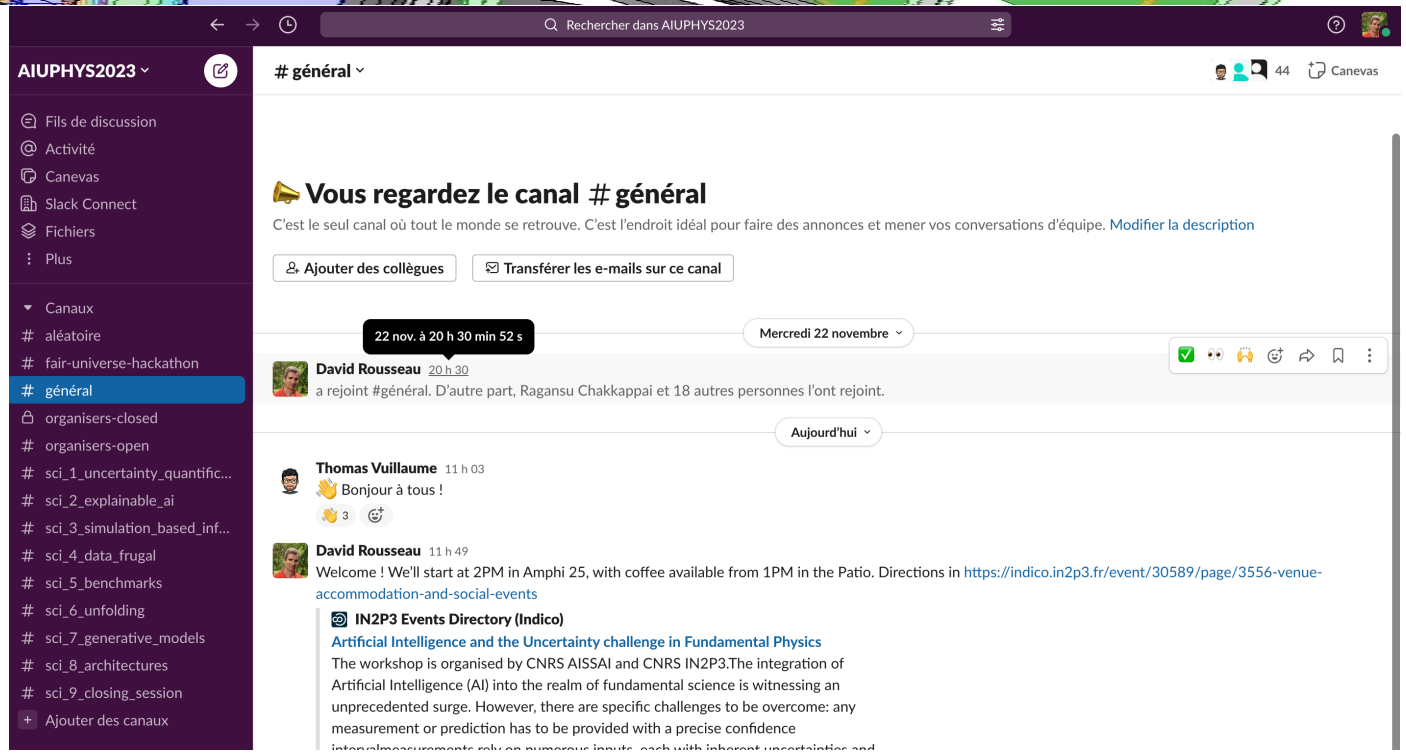
Social Events

- 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

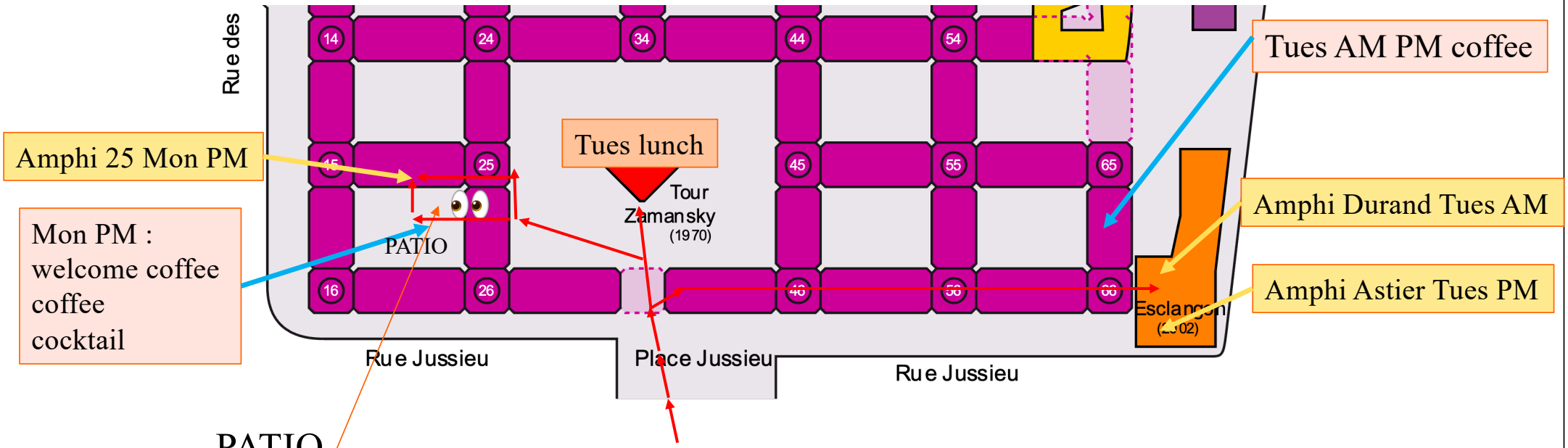
- Primary channel of communication
- Make sure you're connected (ask your neighbour)
- #general : for announcements
- #organisers_open : practical issues
- #random : tourism, outing, whatevere.g.
- Use slack for scientific exchanges, one channel per session : #sci_<n>_<session name>



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



Amphi 25 Mon PM

Mon PM :
welcome coffee
coffee
cocktail

Tues AM PM coffee

Amphi Durand Tues AM

Amphi Astier Tues PM

PATIO

Metro Jussieu

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

Sponsors

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