


Programme outline

Topic 1 – Introduction

Promise and challenges of data-driven modelling **1h** **E. Décossin** (EDF) 


Topic 2 – Effective AI integration into R&D: requirements and implications

The energy vs. information nexus **3h** **V. Mazauric** (Schneider Electric) 

Machine Learning and Deep Learning: from fundamentals to scientific applications **3h** **G. Daniel** (CEA) 


Topic 3 – Reactor neutronics and nuclear physics


Nuclear data: gap filling, data curation, automation... **3h** **D. Rochman** (PSI) 

Core optimisation using Machine Learning, validation data when there is no experimental data **3h** **K. Zhang** (KIT) 


Topic 4 – Thermal hydraulics


High quality experimental data in challenging measuring environments **2h** **J. Pacio** (SCK CEN) 


Machine Learning vs. traditional methods for CHF prediction: accuracy, uncertainty, and transferability **2h** **M. Lee** (KAERI) 

AI architectures for computational fluid dynamics **2h** **A. Lintermann** (FZJ) 

Topic 5 – Fuels and materials


Changes of paradigm in nuclear materials science: how modern digital technologies applied to materials support nuclear energy competitiveness **2h** **L. Malerba** (CIEMAT) 

Machine Learning-assisted multiscale modeling of materials, application to nuclear fuels **2h** **J. Tranchida** (CEA) 

Surrogate-aided Bayesian calibration for fuel performance modelling: limitations from model inadequacy and opportunities for surrogate applications beyond calibration **2h** **G. Robertson** (Westinghouse Electric) 

Topic 6 – Integration, safety, operational data

Use of Machine Learning techniques in power plant safety studies **2h** **A. Diab** (Ain Shams Univ.) 

Safety, confidence in metamodels and data-driven models **2h** **J. Baccou** (ASNR) 

Seminar

AI and humans **2h** **W. Mackay** (INRIA) 

Group activities on selected scientific topics

Mentors : G. Daniel, S. Muller, A. Marrel (CEA), B. looss (EDF), A. Diab (Ain Shams Univ)

Technical visits