Programme outline

Topic 1 – Introduction

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

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

The energy vs. information nexus	3 h	**V. Mazauric** (Schneider Electric)	🇫🇷
Machine Learning and Deep Learning: from fundamentals to scientific applications	3 h	**G. Daniel** (CEA)	🇫🇷

Topic 3 – Reactor neutronics and nuclear physics

Nuclear data: gap filling, data curation, automation…	3 h	**D. Rochman** (PSI)	🇨🇭
Core optimisation using Machine Learning, validation data when there is no experimental data	3 h	**K. Zhang** (KIT)	🇩🇪

Topic 4 – Thermal hydraulics

Good experimental data (CFD grade), gaps	2 h	**J. Pacio** (SCK CEN)	🇧🇪
CHF predictions – How far can we get with computer simulations?	2 h	**M. Lee** (KAERI)	🇰🇷
Physics-informed neural networks in computational fluid dynamics	2 h	**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	2 h	**L. Malerba** (CIEMAT)	🇪🇸
Machine Learning-assisted multiscale modeling of materials, application to nuclear fuels	2 h	**J. Tranchida** (CEA)	🇫🇷
Fuel element modelling, good experiments, best practices to get the data	2 h	**G. Robertson** (Westinghouse Electric)	🇸🇪

Topic 6 – Integration, safety, operational data

Use of Machine Learning techniques in power plant safety studies	2 h	**A. Diab** (Ain Shams Univ.)	🇪🇬
Safety, BEPU, confidence in metamodels and data-driven models, representative experiments	2 h	**J. Baccou** (ASNR)	🇫🇷

Seminar

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

Group activities on selected scientific topics

Mentors : G. Daniel (CEA), Sacha Muller (CEA), A. Marrel (CEA), B. Iooss (EDF)

Technical visits