

**OECD Nuclear Energy Agency (NEA) and Halden HTO Project
Summer school 2024
AI for Nuclear**

Byparken, Halden, September 1st – September 5th, 2024

Summer school Chair: Morgan Kjølervbakken, IFE

Sunday September 1		
18:00-21:00	Getting acquainted, evening meal and registration	
Monday September 2		
08:30-09:00	Registration	
09:00-09:20	Welcome, introduction of participants	Bjørn Axel Gran, IFE
09:20-09:30	Introduction to the Halden HTO program	Andreas Bye, IFE
09:30-10:00	AI for Nuclear – an overview of current and proposed research in the Halden HTO Project, focus on AI applications, various use cases and opportunities	Morgan Kjølervbakken, IFE
10:00-12:00 (Coffee 10:30-10:45)	Human AI teaming <ul style="list-style-type: none"> • Human role in AI applications • AI Ethics 	Ilias Pappas, Polyxeni Vasilakopoulou UiA / NTNU
12:00-13:00	Lunch	
13:00-16:00 (Coffee 14:30-14:45)	AI and Regulations <ul style="list-style-type: none"> • Why a new regulatory framework is needed • AI in a nuclear safety setting: what are plausible application areas and what are not? • Regulatory review processes • Relevant knowledge gaps – current initiatives and future plans 	Luis Betancourt, U.S. Nuclear Regulatory Commission, NRC

16:00-17:00	Panel session: Key takeaways from today's sessions: Implications for application areas <ul style="list-style-type: none"> Summaries by today's speakers Takeaways from other speakers and the attendants 	Chair: A. Bye Today's Speakers: L. Betancourt M. Kjølervbakken I. Pappas P. Vasilakopoulou
19:00	Social gathering, no dinner	
Tuesday September 3		
08:30-09:30	AI initiatives in the U.S. Department of Energy	Daniel M. Nichols, U.S. DOE
09:30-12:00 (Coffee 10:30-10:45)	AI and Digital Twins <ul style="list-style-type: none"> Applications of AI for nuclear Digital Twins Technical opportunities and challenges 	Vivek Agarwal, Idaho National Laboratory, INL
12:00-13:00	Lunch	
13:00-14:30	HOF challenges of AI in nuclear <ul style="list-style-type: none"> Regulation and HOF challenges Sandbox for AI applications 	Richard Screeon, Office for Nuclear Regulation, ONR
14:30-14:45	Coffee	
14:45-16:00	OECD Nuclear Energy Agency (NEA) activities fostering AI and Machine Learning in Nuclear Engineering	Oliver Buss, OECD NEA
16:00-17:00	Panel session: Key takeaways from today's sessions: Implications for boundaries for the human role and requirements for human actions <ul style="list-style-type: none"> Summaries by today's speakers Takeaways from other speakers and the attendants 	Chair: M. Kjølervbakken Today's Speakers: D.M. Nichols V. Agarwal R. Screeon O. Buss
18:00	Social event, dinner at Kongshallene	

Wednesday September 4		
09:00-12:00 (Coffee 10:30-10:45)	Utility perspectives and experiences <ul style="list-style-type: none"> • AI AI/ML for monitoring & diagnostics • Data driven decision making • Analyzing text data using LLM • Next generation of physic based Digital Twins • How to handle new risks due to generative AI 	Brian Mori, Ontario Power Generation, OPG
12:00-13:00	Lunch	
13:00-16:00 (Coffee 14:30-14:45)	AI, Data & Robotics AI in nuclear emergency preparedness Overview of AI, data and robotics in nuclear asset/process management <ul style="list-style-type: none"> • Application in decommissioning • Applications for commissioning and green lifecycle AI and mobile robots in the nuclear <ul style="list-style-type: none"> • Activities under the EGRRS expert group of NEA • Earlier (CLEANDEM) and planned (XS-Ability) Euratom activities AI and Physics Modelling <ul style="list-style-type: none"> • AI, gamma mapping and source deconvolution • AI and nuclear physics powered digital twins, integration and application examples 	Deborah H. Oughton, Norwegian University of Life Sciences, NMBU István Szőke & Réka Szőke, IFE Abdenour Benkrid & Omar Zarah, IFE Mustafa A H Jarallah & Bálint Batki, IFE
16:00-17:00	Panel session: Key takeaways from today's sessions: Implications for technical opportunities and application areas <ul style="list-style-type: none"> • Summaries by today's speakers • Takeaways from other speakers and the attendants 	Chair: M. Kjølerbakken Today's Speakers: B. Mori D.H. Oughton I. Szőke R. Szőke A. Benkrid O. Zarah M.A.H. Jarallah B. Batki

Thursday September 5		
<p>09:00-11:30</p> <p>(Coffee 10:30-10:45)</p>	<p>Visit to HTO-labs Demonstrations and mini-workshops and exercises</p> <ul style="list-style-type: none"> • HADRON lab, Robotics • Cyber-lab demonstration • VR/AR, AI application examples • Human-AI automation mini-workshop 	<p>IFE</p> <p>Istvan Szöke Per-Arne Jørgensen Michael Louka, Morgan Kjølervbakken Salvatore Massaiu/ Per Øivind Braarud</p>
<p>11:30-12:30</p>	<p>Summary session:</p> <p>Key takeaways from the summer school: Opportunities and challenges Regulations, applications, Human-AI Teaming</p>	<p>M. Kjølervbakken / A. Bye, IFE</p>
<p>12:30</p>	<p>Adjourn and Lunch</p>	