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 Kjølerbakken, 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 Kjølerbakken, IFE**
10:00-12:00 (Coffee 10:30-10:45)	**Human AI teaming** • Human role in AI applications • AI Ethics	**Ilias Pappas, NTNU**
12:00-13:00	**Lunch**	
13:00-16:00 (Coffee 14:30-14:45)	**AI and Regulations** • 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 todays' sessions: Implications for application areas** • Summaries by today's speakers • Takeaways from other speakers and the attendants	**Chair**: A. Bye **Todays' Speakers:** L. Betancourt M. Kjølerbakken I. Pappas
19:00	**Social gathering, no dinner**	
Tuesday September 3		
09:00-12:00 (Coffee 10:30-10:45)	**AI and Digital Twins** • 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** • Regulation and HOF challenges • Sandbox for AI applications	**Richard Screeton, 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 todays' sessions: Implications for boundaries for the human role and requirements for human actions** • Summaries by today's speakers • Takeaways from other speakers and the attendants	**Chair:** M. Kjølerbakken **Todays' Speakers:** V. Agarwal R. Screeton 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** • 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** • Application in decommissioning • Applications for commissioning and green lifecycle **AI and mobile robots in the nuclear** • Activities under the EGRRS expert group of NEA • Earlier (CLEANDEM) and planned (XS-Ability) Euratom activities **AI and Physics Modelling** • 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 todays' sessions: Implications for technical opportunities and application areas** • Summaries by today's speakers • Takeaways from other speakers and the attendants	**Chair:** M. Kjølerbakken **Todays' Speakers:** B. Mori D.H. Oughton I. Szőke R. Szőke A. Benkrid O. Zarah M.A.H. Jarallah B. Batki

Thursday September 5		
09:00-11:30 (Coffee 10:30-10:45)	**Visit to HTO-labs** Demonstrations and mini-workshops and exercises • HADRON lab, Robotics • Cyber-lab demonstration • VR/AR, AI application examples • Human-AI automation mini-workshop	**IFE** **Istvan Szöke** **Per-Arne Jørgensen** **Michael Louka,** **Morgan Kjølerbakken** **Salvatore Massaiu/** **Per Øivind Braarud**
11:30-12:30	**Summary session:** **Key takeaways from the summer school:** **Opportunities and challenges** **Regulations, applications, Human-AI Teaming**	**M. Kjølerbakken /** **A. Bye, IFE**
12:30	**Adjourn and Lunch**	