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PLATAFORMA TECNOLÓGICA DE ENERGÍA NUCLEAR DE FISIÓN



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***3rd Workshop of Spanish Users on Nuclear Data on
“Machine Learning in Nuclear Science and Technology
Applications”***

Welcome by Prof. Oscar Cabellos

May 27, 2021

Universidad Politécnica de Madrid

Instituto de Fusion Nuclear “Guillermo Velarde”

ETS de Ingenieros Industriales de Madrid, Madrid, Spain

What ‘INGENIA-NUCLEAR’ course is?

- ❑ INGENIA-NUCLEAR is focused “on design & simulation of PWRs
- ❑ Course within in the “Master in Industrial Engineering” and “Master in Nuclear Science and Technology” Programs at the Polytechnical University of Madrid (UPM)
- ❑ 12 ECTS : 5hours/week – 2 semesters
- ❑ INGENIA is based on the CDIO (Conceive-Design-Implement-Operate) initiative, which has been also adopted by other Universities: Delft, Politecnico di Milano, MIT, Stanford...
- ❑ See more information about CDIO at: www.cdio.org

Other INGENIA projects at UPM (in total 14)



PV facility



Videogame development



Design of Daily-life products



Automotive Engineers



3rd Edition 'INGENIA-NUCLEAR': course 2020-2021

3rd Workshop of Spanish Users on Nuclear Data

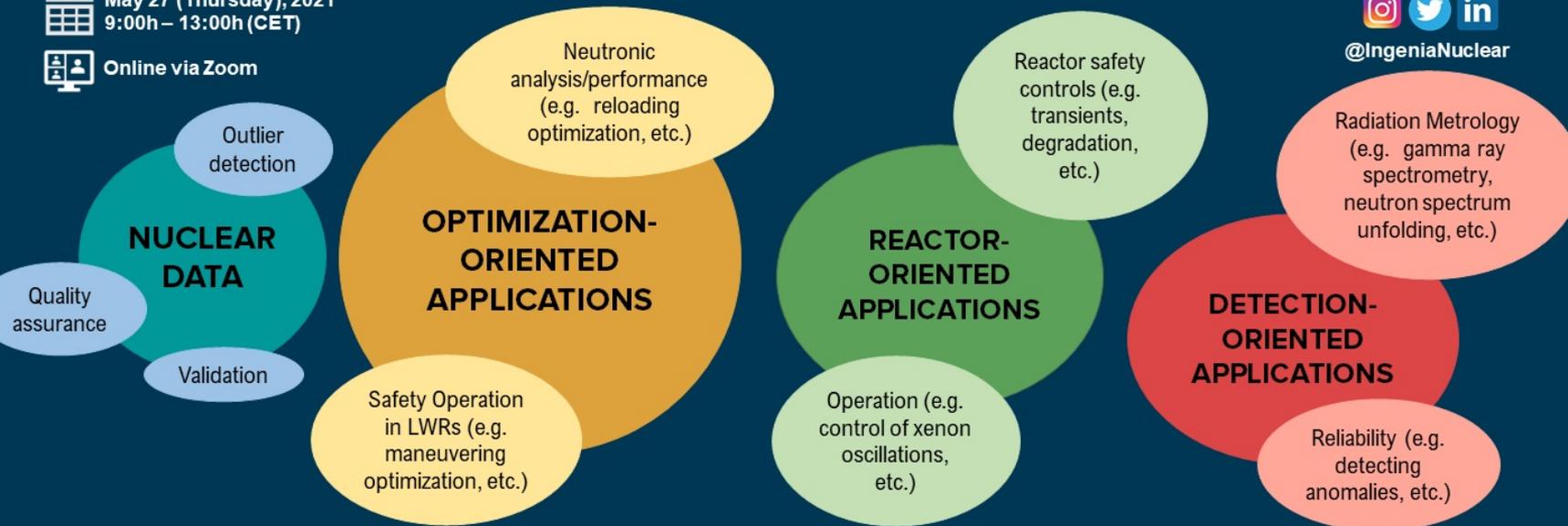
MACHINE LEARNING IN NUCLEAR SCIENCE AND TECHNOLOGY APPLICATIONS

May 27 (Thursday), 2021
9:00h – 13:00h (CET)

Online via Zoom



@IngeniaNuclear



Universidad Politécnica de Madrid
Instituto de Fusión Nuclear - "Guillermo Velarde"
ETS de Ingenieros Industriales de Madrid, Madrid, Spain
C/Jose Gutiérrez Abascal, 2. 28006 Madrid (Spain)

SIGN IN
E-mail to: oscar.cabellos@upm.es
(REGISTRATION BEFORE MAY 15)
This is a no-fee Workshop.



Course within the UPM "Master in Industrial Engineering" and the "Master of Nuclear Science and Technology"
Integrated by 14 different courses
12 ECTS: 5 hours/week (September – May)
Based on CDIO (Conceive, Design, Implement and Operate)





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Participants in the 3rd Workshop on “Machine Learning in Nuclear Science and Technology Applications”

Statistics of the Workshop

	#	Country	Participants	#	Country	Participants	
by Country	1	Argentina	13	11	Japan	3	
	2	Australia	1	12	Perú	1	
	3	Austria	3	13	South Korea	1	
	4	Belgium	2	14	Spain	94	
	5	Bolivia	1	15	Sweden	5	
	6	Finland	2	16	Switzerland	7	
	7	France	6	17	UAE	4	
	8	Germany	8	18	UK	7	
	9	Iran	1	19	USA	4	
	10	Italy	2				
						TOTAL	165

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Statistics of the Workshop

by Institution	#	Institution	P.	#	Institution	P.	#	Institution	P.
		1	-	1	21	IFIC (CSIC-UV)	5	41	UAM
	2	Agencia Bolivia de Energía Nuclear	1	22	INGENIA/UPM	27	42	UCM	2
	3	AIT Austrian Institute of Technology	1	23	Instituto Balseiro	3	43	UKAEA	3
	4	Azad University	1	24	INVAP	2	44	UNED	3
	5	BYLOR JV	1	25	IRSN	1	45	Universidad de Sevilla	1
	6	CDTI	1	26	JAEA	1	46	Universita di Pisa	2
	7	CEA	3	27	Jyvaskyla University	1	47	University of Sharjah	4
	8	CEIDEN	1	28	KIT/INR	7	48	University of Tennessee	2
	9	CIEMAT	4	29	Kyushu University	2	49	University of York	1
	10	CIMNE	1	30	LANL	1	50	UNSW Sydney	1
	11	CNEA	8	31	LUT University	1	51	UPC	2
	12	CSN	3	32	NCSU	1	52	UPM	13
	13	EDF-ENERGY	2	33	NFQ	4	53	Uppsala University	5
	14	ENDESA	1	34	Nuclear Energy Agency	2	54	UPV	1
	15	ENUSA	7	35	Pont. Univ. Católica del Perú	1	55	UV	1
	16	EURECAT	1	36	PSI	7			
	17	GD Energy Services	1	37	SCK-CEN	2			
	18	IAEA	2	38	SNU Nuclear Energy Policy Center	1			
	19	Iberdrola	2	39	Technical University of Munich	1			
	20	IDOM	6	40	TECNATOM	5			
								TOTAL	165



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Agenda (14 technical presentations)

Start - End	Presenter (Institution)	Title
9:00 – 9:15	O. Cabellos (UPM) J. Dies (CSN)	Welcome and Introduction
9:15 – 9:30	T. Kin (Kyushu University)	ML in radiation metrology: Application of Gamma-ray spectrometry
9:30 – 9:45	B. Briquez (TECNATOM)	Practical cases using Machine Learning applied to education&training, operation and inspection of nuclear power plants
9:45 – 10:00	A. Sánchez (CIEMAT)	Deep Learning applied to Capture Cross Section Data Analysis
10:00 – 10:15	A. Villacorta (CIEMAT)	Unsupervised learning for nuclear fuel cycle applications
10:15 – 10:30	E. Mendoza (CIEMAT)	Machine learning applied to the modelling of nuclear de-excitation cascades
10:30 – 10:45	Coffee break and photo of participants	
10:45 – 11:00	A. Jacas Arnau (PSI)	Surrogate Models for Nuclear Burn-up Calculations and Uncertainty Propagation
11:00 – 11:15	Shama Ahmed (PSI)	Predicting the Bias in Calculations of Spent Nuclear Fuel Characteristics
		CONTINUE ->



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Agenda (14 technical presentations)

Start - End	Presenter (Institution)	Title
11:15 – 11:30	J. Hansson (Uppsala University)	Combining Levenberg–Marquardt and Gaussian Processes for treatment of model defects in nuclear data evaluation
11:30 – 11:45	V. Solans (Uppsala University)	Optimisation of used nuclear fuel canister loading using a neural network and genetic algorithm
11:45 – 12:00	G. Clavero, S. Moreno and J. Moreno INGENIA (UPM)	Machine Learning techniques in V&V of Nuclear Data Bases. Examples: EXFOR, JANIS/NEA evaluated data and ICSBEP
12:00 – 12:15	G. Gabarain, J. A. Monleón and M. Ruiz INGENIA (UPM)	Machine Learning in Reactor-oriented applications. Examples: optimal design of PWR fuel loading pattern, manoeuvres optimization and modelling and control of xenon oscillations
12:15 – 12:30	N. Schmidt (CNEA)	Neutron and gamma beam simulation using OpenMC and Python's libraries for Machine Learning
12:30 – 12:45	D. Neudecker (LANL)	Using Machine Learning Algorithms for Large-scale Nuclear-data Validation
12:45 – 12:50	G. Schnabel (IAEA/NDS)	Announcement: “ Technical Meeting on Artificial Intelligence for Nuclear Technology and Applications ” IAEA virtual-meeting, 25 – 29 October, 2021
12:50 – 13:00	Final discussion and closing the meeting	



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Some kind remarks

For all participants

- During the meeting**please** ... mute your microphones by default and unmute to speak
- Use of headphones is recommended to prevent audio feedback loops
- Please, type your questions in the chat or ask a question out loud by using Zoom's 'raise hand', if time allows.

For speakers

- You will be asked to **share your screen** and present through your desktop using Zoom
- The format of the presentation is **12min** + 2min questions
- Please, keep the presentations within the allotted time. This will allow to keep the session running to schedule
- Send your final presentation file for distributing to all participants

Many thanks for your attention!

ENJOY THE WORKSHOP!