

Workshop on **Nuclear Power Plant Simulators for Education**

29 October – 9 November 2007

Miramare - Trieste, Italy

Directors/Organizers:

G. Bereznai

Dean, Energy Systems and Nuclear Science
University of Ontario Institute of Technology, Canada

W. K. Lam

CTI Simulation International Corporation, Toronto, Canada

C. Po

Micro-Simulation Technology, Montville, USA

N. Tikhonov

Moscow Institute for Physics & Engineering, Moscow, Russia

C. Tuniz

ICTP, Trieste, Italy

A. Pryakhin, S.-G Moon, J. Cleveland

IAEA, Vienna, Austria

P R O G R A M M E

ALL LECTURES WILL BE HELD AT THE
ADRIATICO GUEST HOUSE, GIAMBIAGI LECTURE HALL
(lower level 1)

ALL COMPUTER SESSIONS WILL BE HELD IN THE
EKLUND COMPUTER LABORATORY
(lower level 1)

Session #	Time	Title/subject
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WEEK 1
MONDAY, 29 OCTOBER 2007

1	08.30 - 10.30	REGISTRATION and ADMINISTRATIVE FORMALITIES outside the Giambiagi Lecture Hall, lower level 1
2	10.30 - 11.00	Welcoming and Introduction C. Tuniz, ICTP A. Pryakhin, IAEA <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab
	11.00 - 11.15	Coffee break
3	11.15 - 12.15	PCTTRAN Simulator of a PWR with Active Safety Systems. L. Po <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	12.15 - 13.30	Lunch Break
4	13.30 - 15.15	PCTTRAN Simulator of a PWR with Active Safety Systems. L. Po <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	15.15 - 15.30	Coffee Break
5	15.30 - 16.30	PCTTRAN Simulator of a PWR with Active Safety Systems. L. Po <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab

WEEK 1
TUESDAY, 30 OCTOBER 2007

6	08.30 - 10.15	PCTTRAN Simulator of a PWR with Active Safety Systems. L. Po <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	10.15 - 10.45	Coffee break
7	10.45 - 12.15	TRIGA Simulator L. Po <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	12.15 - 13.30	Lunch Break
8	13.30 - 15.15	CANDU-9 Systems & Overall Unit Control G. Bereznai <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab
	15.15 - 15.30	Coffee break

Session #	Time	Title/subject
9	15.30 - 16.45	CANDU 9 Systems and Overall Unit Control G. Bereznai <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab

WEEK 1
WEDNESDAY, 31 OCTOBER 2007

10	08.30 - 10.15	CANDU 9 Systems and Overall Unit Control G. Bereznai <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	10.15 - 10.45	Coffee break
11	10.45 - 12.15	CANDU 9 Systems and Overall Unit Control G. Bereznai <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	12.15 - 13.30	Lunch Break
12	13.30 - 15.15	CANDU-9 Reactor Systems and Regulation G. Bereznai <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab
	15.15 - 15.30	Coffee break
13	15.30 - 16.45	CANDU 9 Reactor Systems and Regulation G. Bereznai <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab

WEEK 1
THURSDAY, 1 NOVEMBER 2007

14	08.30 - 10.15	CANDU-9 Heat Transport System and Control G. Bereznai <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab
	10.15 - 10.45	Coffee break
15	10.45 - 12.15	CANDU-9 Heat Transport System and Control G. Bereznai <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	12.15 - 13.30	Lunch Break
16	13.30 - 15.15	CANDU-9 Balance of Plant Systems G. Bereznai <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab
	15.15 - 15.30	Coffee Break

Session #	Time	Title/subject
17	15.30 - 16.45	Balance of Plant Systems G. Bereznai <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab

WEEK 1

FRIDAY, 2 NOVEMBER 2007

18	08.30 - 10.15	Advanced CANDU Reactor (ACR) G. Bereznai <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab
	10.15 - 10.45	Coffee Break
19	10.45 - 12.15	Advanced CANDU Reactor (ACR) G. Bereznai <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	12.15 - 13.30	Lunch Break
20	13.30 - 15.15	CANDU and ACR major unit events G. Bereznai <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab
	15.15 - 15.30	Coffee Break
21	15.30 - 16.45	Evolution of Full-Scope Simulators Development - Korean experience S.-G. Moon <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab

WEEK 2

MONDAY, 5 NOVEMBER 2007

22	08.30 - 10.15	Advanced Pressurized Water Reactor (APWR) NPP Description and Characteristics. APWR Overview. Demonstrate Simulation Effects using APWR Simulator. W. K. Lam <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab
	10.15 - 10.45	Coffee break
23	10.45 - 12.15	Presentation of APWR Simulator Core Model and Demonstration of Reactor Controls and Passive Safety System Responses. W. K. Lam <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab
	12.15 - 13.30	Lunch Break

Session #	Time	Title/subject
24	13.30 - 15.15	Advanced PWR Simulator Exercises - (a) Hands-on interaction with the simulator – freeze, run, IC, malfunctions, etc. (b) Review each major APWR subsystem, (c) Practice power maneuver. W. K. Lam <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	15.15 - 15.30	Coffee break
25	15.30 - 16.45	Advanced PWR Simulator Exercises – Trips and Recovery. W. K. Lam <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab

WEEK 2
TUESDAY, 6 NOVEMBER 2007

26	08.30 - 10.15	APWR Simulator Malfunction Exercises – Study Abnormal/Emergency Event Evolutions, Safety Limits and Operational Guidelines. W. K. Lam <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	10.15 - 10.45	Coffee break
27	10.45 - 12.15	APWR Simulator Exercises (continued) – Malfunctions with special focus on Passive Safety System Responses. W. K. Lam <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	12.15 - 13.30	Lunch Break
28	13.30 - 15.15	Advanced Boiling Water Reactor (ABWR) NPP Description and Characteristics; ABWR Overview & Potential Project; ESBWR. Demonstrate Simulation Effects using the ABWR Simulator. W. K. Lam <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab
	15.15 - 15.30	Coffee break
29	15.30 - 16.45	Presentation of ABWR Steady State Model and Dynamic Model as the mathematical basis for the Simulator. W.K. Lam <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab

WEEK 2
WEDNESDAY, 7 NOVEMBER 2007

Session #	Time	Title/subject
30	08.30 - 10.15	ABWR Steady State Mass & Energy Model Exercise – to find out how the coolant quality plays an important role in reactor power control. W.K. Lam <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	10.15 - 10.45	Coffee break
31	10.45 - 12.15	Review major ABWR Subsystems – Nuclear Boiler System; Safety Systems; Auxiliary Systems; BOP; Plant Operation. ABWR Simulator Exercises – Practice Power Maneuver. W.K. Lam <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	12.15 - 13.30	Lunch Break
32	13.30 - 15.15	ABWR Simulator Exercises – Trips and Recovery. W.K. Lam <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	15.15 - 15.30	Coffee break
33	15.30 - 16.45	ABWR Simulator Malfunction Exercises with discussion on Safety Design Approach for: Operational Transients ; Design basis Events ; Special Regulatory Mandated Events ; Severe Accidents. W.K. Lam <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab

WEEK 2
THURSDAY, 8 NOVEMBER 2007

34	08.30 - 10.15	Overview of the WWER simulator. Reactor system equipment. Constructional and physical characteristics of the core. N. Tikhonov <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab
	10.15 - 10.45	Coffee break
35	10.45 - 12.15	Overview of the WWER simulator. Scope of simulation, simulator display formats, distinctive features and capabilities. User interface. N. Tikhonov <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	12.15 - 13.30	Lunch Break

Session #	Time	Title/subject
36	13.30 - 15.15	WWER simulator exercises. Demonstration of transients. Review of reactor systems response. N. Tikhonov <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	15.15 - 15.30	Coffee break
37	15.30 - 16.45	WWER simulator exercises. Practice - Reactor trips and recovery N. Tikhonov <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab

WEEK 2

FRIDAY, 9 NOVEMBER 2007

38	08.30 - 10.15	WWER simulator exercises. Stationary processes, fuel burnup, determination of the core major neutron-physics characteristics. N. Tikhonov <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	10.15 - 10.45	Coffee break
39	10.45 - 12.15	WWER Simulator exercises. Reactor startup from hot standby N. Tikhonov <input type="checkbox"/> Lecture Hall <input checked="" type="checkbox"/> Computer Lab
	12.15 - 13.30	Lunch Break
40	13.30 - 15.15	Feedback and closing session A. Pryakhin <input checked="" type="checkbox"/> Lecture Hall <input type="checkbox"/> Computer Lab