

SPRING SCHOOL SODIUM COOLED FAST REACTOR



ESFR-SMART



UNIVERSITY OF
CAMBRIDGE

AN ONLINE WEBINAR



MAR
29-31



9 - 17:30
BST

29th of March 2021 | ESFR-SMART Spring School

09:00-09:10 Opening Ceremonies
Welcome
Dr Eugene Shwageraus, Dr Christian Latgé
University of Cambridge
Commissariat à l'énergie atomique et aux énergies alternatives (CEA)

09:10-09:20 Brief Introduction of the Agenda
Dr Eugene Shwageraus, University of Cambridge

Session 1 **Sodium Cooled Fast Reactor Overview (Past & Present)**
Chair **Dr Christian Latgé**

09:20-10:40 Overview of FRs in the world & ASTRID project
Dr Christian Latgé
Commissariat à l'énergie atomique et aux énergies alternatives (CEA)
09:20-09:50

CP-ESFR & ESFR-SMART

Dr Konstantin Mikityuk

Paul Scherrer Institute

09:50-10:10

PFR operational feedback

Mr Tony Judd

Former United Kingdom Atomic Energy Authority

10:10-10:40

10:40-11:00 **Break**

11:00-12:30 EU GEN-IV activities
Dr Roger Garbil and Dr Cristina Fernandez-Ramos
European Commission
11:00-11:20

IAEA Activities on Technology of Sodium Cooled Fast Reactors

Dr Vladimir Kriventsev

International Atomic Energy Agency

11:20-11:40

Fast Reactor Activities in NEA

Dr Tatiana Ivanova

OECD Nuclear Energy Agency

11:40-12:00

Panel Discussion

12:00-12:30

12:30-14:00 **Lunch Break**

Session 2 **Educational Session (Lecture 40' + 10' Q&A)**
Chair **Dr Konstantin Mikityuk**

14:00-15:40 Lecture 1: SFR fuel: fundamentals and properties
Dr Nathalie Chauvin
Commissariat à l'énergie atomique et aux énergies alternatives (CEA)
14:00-14:50

Lecture 2: Deterministic modelling of nuclear systems

Dr Christophe Demaziere

Chalmers University

14:50-15:40

15:40-16:00 **Break**

16:00-17:40 Lecture 3: SFR thermal-hydraulics
Prof Dr Robert Stieglitz
Karlsruhe Institute of Technology
16:00-16:50

Lecture 4: Benchmark exercise for core neutronics and transient behavior

Dr Alexander Ponomarev

Paul Scherrer Institute

16:50-17:40

17:40 **End of the 1st Day**

30th of March 2021 | ESFR-SMART Spring School

ESFR-SMART R&D activities and studies	
Session 3-1	ESFR Core & Fuel
Chair	Dr Eugene Shwageraus
09:00-10:15	Initial core performance & burnup calculations <i>Dr Emil Fridman</i> <i>Helmholtz-Zentrum Dresden-Rossendorf</i> 09:00-09:25
	Coupled core T-H & neutronics simulation <i>Dr Jiri Krepel</i> <i>Paul Scherrer Institute</i> 09:25-09:50
	MOX fuel safety and performances <i>Dr Dragos Staicu</i> <i>Joint Research Centre</i> 09:50-10:15
10:15-10:40	Break
Session 3-2	Sodium Boiling & Molten Pool Behaviour
Chair	Dr Calogera Lombardo
10:40-11:30	Sodium boiling and transitional convection flows & Sodium boiling tests <i>Dr Antoine Gerschenfeld</i> <i>Commissariat à l'énergie atomique et aux énergies alternatives (CEA)</i> 10:40-11:05
	ULOF initiation phase analyses <i>Dr Andrei Rineiski</i> <i>Karlsruhe Institute of Technology</i> 11:05-11:30
Session 3-3	Safety System & Accident Mitigation
Chair	Dr Jiri Krepel
11:30-12:20	ESFR decay heat removal system <i>Dr Calogera Lombardo</i> <i>Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile (ENEA)</i> 11:30-11:55
	Passive core shutdown system <i>Dr Evaldas Bubelis</i> <i>Karlsruhe Institute of Technology</i> 11:55-12:20
12:20-14:00	Lunch Break
Session 3-4	Severe Accidents Mitigation
Chair	Dr Andrei Rineiski
14:00-15:40	Transition and expansion phase analysis <i>Dr Michael Flad</i> <i>Karlsruhe Institute of Technology</i> 14:00-14:25
	Source terms <i>Dr Luis Enrique Herranz, Dr Nathalie Girault</i> <i>Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (Ciemat)</i> <i>Institut de radioprotection et de sûreté nucléaire (IRSN)</i> 14:25-14:50
	Sodium fire - Atmospheric dispersion of Na aerosols & impact studies: modeling and simulation <i>Dr Lynda Porcheron, Dr Christian Latgé</i> <i>Électricité de France (EdF)</i> <i>Commissariat à l'énergie atomique et aux énergies alternatives (CEA)</i> 14:50-15:15
	Corium behaviour relocated on core catcher <i>Dr Michel Gradeck</i> <i>Laboratory in Energy and Theoretical and Applied Mechanics (LEMTA)</i> 15:15-15:40
15:40-16:00	Break
Session 3-3	Instrumentation
Chair	Dr Marat Margulis
16:00-16:25	Flow & velocity measurements - models and experiments <i>Dr Sven Eckert</i> <i>Helmholtz-Zentrum Dresden-Rossendorf</i> 16:00-16:25
Chair	Synthesis and Discussion
Chair	Dr Marat Margulis
16:25-17:30	<i>Dr Konstantin Mikityuk</i> <i>Paul Scherrer Institute</i> 16:25-16:50
	Discussion 16:50-17:30
17:30	End of the 2nd Day

Session 4-1	Student Presentation
Chair	Antonio Jimenez-Carrascosa
09:00-10:00	<p>Modeling and assessment of new safety measures for Generation-IV European Sodium Fast Reactor <i>Janos Bodi</i> <i>Paul Scherrer Institute</i> 09:00-09:15</p> <p>Experimental simulation of core-catcher ablation by corium jet with water / transparent ice system <i>Alexandre Lecoanet</i> <i>Laboratory in Energy and Theoretical and Applied Mechanics (LEMTA)</i> 09:15-09:30</p> <p>Electric machines with liquid metal as a working body <i>Artūrs Brēķis</i> <i>Institute of Physics University of Latvia</i> 09:30-09:45</p> <p>A liquid metal vertical confined backward facing step experiment: measurement chain development and calibration Thomas Schaub <i>Karlsruhe Institute of Technology</i> 09:45-10:00</p>
10:00-10:15	Break
Session 4-2	Student Presentation
Chair	Janos Bodi
10:15-11:15	<p>Numerical modeling of agitation and mixing in bubbly flows - Application to convection phenomena in a corium bath <i>Florian Le Roy de Bonneville</i> <i>Commissariat à l'énergie atomique et aux énergies alternatives (CEA)</i> 10:15-10:30</p> <p>Modeling of out-of-core structure expansions in SFRs <i>Vincenzo Anthony Di Nora</i> <i>Helmholtz-Zentrum Dresden-Rossendorf</i> 10:30-10:45</p> <p>Nuclear data sensitivity and uncertainty analysis for the ESFR-SMART core <i>Antonio Jimenez-Carrascosa</i> <i>Universidad Politécnica de Madrid</i> 10:45-11:00</p> <p>Cross section generation for GeN-Foam using WIMS <i>Una Baker (Davies)</i> <i>University of Cambridge</i> 11:00-11:15</p>
11:15-13:00	Lunch Break
Other Coolants	
Session 5-1	Heavy Liquid Metals (Pb & Pb-Bi)
Chair	Dr Christian Latgé
13:00-14:15	<p>ALFRED and LFR projects <i>Dr Marco Caremello</i> <i>ANSALDO Nucleare</i> 13:00-13:20</p> <p>MYRRHA project <i>Dr Didier de Bruyn</i> <i>SCK-CEN</i> 13:20-13:40</p> <p>R&D topics to support these projects <i>Dr Daniele Martelli</i> <i>Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile (ENEA)</i> 13:40-14:00</p> <p>Discussion 14:00-14:15</p>
14:15-14:30	Break
Session 5-2	Gas-cooled Reactors
Chair	Dr Eugene Shwageraus
14:30-15:45	<p>ALLEGRO and GFR projects <i>Dr Branislav Hatala</i> <i>Vyskumny Ustav Jadrovych Elektrarni, (VUJE)</i> 14:30-14:50</p> <p>UK Gas cooled reactors operational feedback <i>Dr Richard Stainsby</i> <i>Jacobs Engineering Group</i> 14:50-15:10</p> <p>R&D topics to support these projects <i>Dr Petr Vacha</i> <i>UJV Rez</i> 15:10-15:30</p> <p>Discussion 15:30-15:45</p>

15:45-16:00 Break

Session 5-3 Molten Salt Reactors

Chair Dr Konstantin Mikityuk

16:00-17:15 Overview on Molten Salt Reactors

Dr Paul Gauthé

Commissariat à l'énergie atomique et aux énergies alternatives (CEA)

16:00-16:20

MSR fuel cycle

Dr Ondrej Benes

Joint Research Centre Karlsruhe

16:20-16:40

H2020 Samosafer: overview on required R&D

Dr Jan-Leen Kloosterman

TU-Delft

16:40-17:00

Discussion

17:00-17:15

17:15-17:30 Summary & Conclusion, Closing

Dr Eugene Shwageraus

University of Cambridge

17:30 End of the Meeting