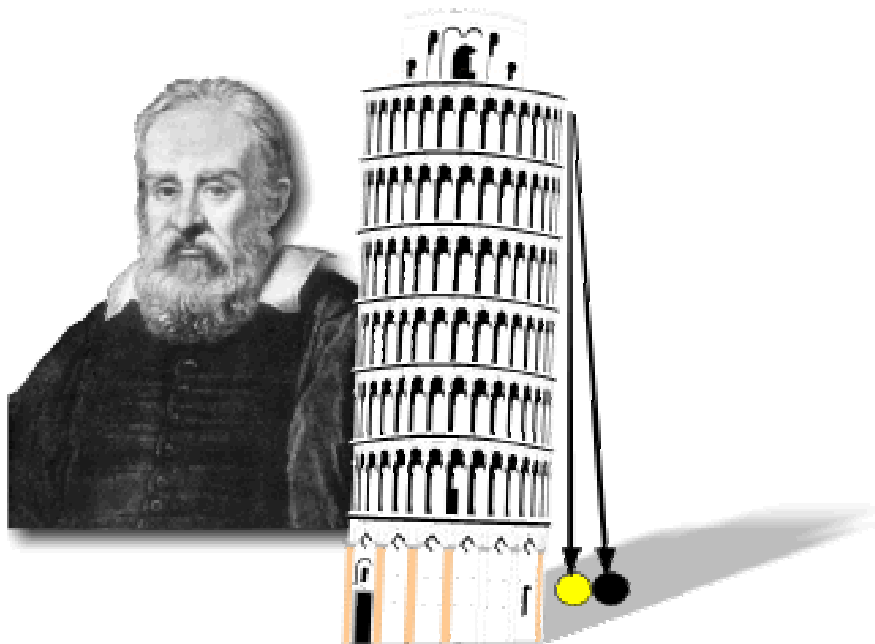




## **2<sup>nd</sup> ESNII plus Summer School: “The challenges of the future Gen IV Reactors: safety issues in support to the design and operation”**

*School of Engineering, University of Pisa – CIRTEN, Italy*

*Pisa, May 09<sup>th</sup> -11<sup>th</sup> , 2016*



### ***School Committee***

Dr. R. Lo Frano (UNIV. PISA- CIRTEN)  
Prof. G. Forasassi (UNIV. PISA- CIRTEN)

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## Goal

The Gen IV systems were selected on the basis of being clean, safe and cost-effective means of meeting increased energy demands on a sustainable basis, while being resistant to diversion of materials for weapons proliferation.

During 2<sup>nd</sup> ESNII plus Summer School, participants will be trained and will gain insight into the state-of-the-art of research focused to the development of fast neutron reactors. This summer school will cover several technological aspects that are essential for a safe design and operation of nuclear systems for their entire lifetime. Safety issues are so presented and discussed.

The school will offer an occasion to discuss and share ideas among the young generation involved in the development of fast neutron reactors. It will be mainly dedicated to PhD students, Post-doc scientists and professionals with a particular interest on the safety of next generation reactors.

Lectures will be given by experts coming from renowned European Universities, Research Centre and other international Institutions or Organizations. They will cover the most advanced Gen IV systems and deal with the mechanical, thermal hydraulic neutronic and materials issues and challenges in instrumentation and design. Moreover the participants will have the opportunity to discuss with the experts on the best practices and technology selection in interactive sessions.

## Topics

The following cross-cutting topics of interest for SFR, LFR and GFR will be discussed:

- material characterization
- core design
- thermal-hydraulic issues
- fluid-structure interaction and sloshing phenomenon
- seismic isolation and investigation
- numerical tools (system codes, CFD codes, code coupling, kinetics modeling, control-oriented modeling etc.)
- utilization of Th as fuel
- integration of safety aspects

All the presentations will be uploaded on the ESNII+ web-site.

## To whom it's addressed

The workshop is addressed to PhD students, young professionals, specialists and any project participants who are interested and who are or will be involved in the following activities for Gen IV reactors:

- Core design
- Seismic analysis
- Safety analysis

Participants from regulatory authorities, and from their scientific and technical support organizations, research institutes and consulting companies are welcome.

## Venue

Aula Magna Pacinotti, School of Engineering of the University of Pisa  
Lg L. Lazzarino, 1, 56124- PISA (ITALY)

## Fees

Participation to 2<sup>nd</sup> ESNII plus Summer School is free of charge for all participants.

## Contact information and registration

To apply for participation, please fill the registration form and send us before **Monday 18<sup>th</sup> April 2016**.

Any questions related to the Summer school should be addressed to: [rosa.lofrano@ing.unipi.it](mailto:rosa.lofrano@ing.unipi.it)

Do not hesitate to contact us if you need further information.

We are looking forward to seeing you in Pisa.



## **2<sup>nd</sup> ESNII plus Summer School Programme**

### **Day 1: Monday 9<sup>th</sup> May 2016**

09:00 Welcome (Prof. Aquaro, director of DICI Dept., Prof. Ceraolo, Dean of the School of Engineering of the University of Pisa, C. Latgé WP5 leader)

09:30 Presentation of CIRTEN (G. Forasassi, Honorary President of CIRTEN)

#### **Session 1: Fast Neutron Reactor projects**

10:00 The future Fast Neutron Reactors: challenges and opportunities (D. Gugiu, INR)

#### **10:30 Coffee break**

11:00 LFR (focusing on ALFRED) project overview: design for safety (A. Alemberti, Ansaldo) (20'+10' discussion)

11:30 ASTRID project overview (C. Latgé, CEA)

12:00 ALLEGRO project overview (A. Vasile, CEA)

#### **12:30 Lunch break**

14:00 ADS reactor concept: MYRRHA configuration and design (D. De Bruyn, SCK-EN)

#### **Session 2: Safety of Fast Neutron Reactors**

14:30 Seismic isolation as a way to increase the safety margin of a nuclear reactor (M. Forni, ENEA)

15:00 Core Compaction: methodological approach and application (R. Lo Frano, CIRTEN-UNIFI)

15:30 PhD Presentation: Seismic sloshing in lead-cooled reactors (M. Jeltov, KTH)

16:10 PhD Presentation: Study of the water leak acoustic in the Steam Generator of SFR (S. Kassab, CEA)

16:30 PhD Presentation: Thermal-hydraulic design of a passive Reactor Cavity Cooling System for ALFRED (F. Merli, ANN)

16:50 PhD Presentation: Fast reactor kinetics modeling using multigroup approach GFR (L. Dujčiková, Slovak University of Technology in Bratislava)

17:30 Discussion

17:50 Adjourn

### **Day 2: Tuesday 10<sup>th</sup> May 2016**

09:00 The strategy of E&T by Europe (L. Ciselj, President of ENEN)

09:30 R&D in support to ASTRID Project (C. Latgé, CEA)

### Session 3: Materials issues; impact on safety

10:00 Corrosion issues in lead cooled reactors (P. Szakalof, KTH)

#### **10:50 Coffee break**

11:10 PhD Presentation: Modeling of nucleation and growth of oxides in LBE by CFD (K. Gladinez, SCK CEN)

11:30 GFR technology: materials and safety issues (A. Vasile, CEA)

#### **12:20 Lunch break**

14:00 PhD Presentation Technologies and materials for advanced gas-cooled nuclear reactors (removal of activity from primary GFR coolant) (M. Janák, UCT Prague)

### Session 4: Safety analysis

14:20 Key elements for safety assessment of Gen IV reactors (M. Nitoi, NRI)

15:00 Identification and categorization of safety issues for ESNII reactor concepts (K. Tucek, JRC)

15:40 PhD Presentation: Analysis of the SFR core under an insertion of positive reactivity (A. Facchini, JRC -UNIFI)

16:00 PhD presentation: Application of the SERPENT2 code for the ALFRED core (I. Visan, INR)

16:20 PhD Presentation: Fuel dispersion analysis by SIMMER code applied to MYRRHA reactor (M. Angelucci, CIRTEN-UNIFI)

16:40 PhD Presentation: Development and validation of system-code/CFD coupling for multi-scale thermal hydraulic analyses (A. Toti, SCK-CEN)

17:00 Discussion (20')

17:20 Adjourn

### **Day 3: Wednesday 11<sup>th</sup> May 2016**

09:00 Coupling between Thermal System and CFD Codes to support LFR (N. Forgiione, Unipi)

09:50 Integrating safety aspects in Gen IV (G. Grasso, ENEA)

#### **10:40 Coffee break**

11:00 PhD Presentation: Reduced order methods for the control-oriented modelling of the Gen-IV Lead-cooled Fast Reactors (S. Lorenzi, CIRTEN)

11:20 PhD Presentation: An innovative decay heat removal system suitable for SFRs (F. Giannetti, Università di Roma)

11:40 PhD Design oriented tools development supporting the conceptual core design phase of heavy liquid metal cooled reactors (F. Lodi, Unibo-KTH)

12:00 Discussion

12:20 Conclusion

#### **12:40 Lunch break**