

APPLICATION

The target participants are junior as well as experienced scientists and engineers in the broad field on nuclear sciences, engineering and technologies.

The application form should be filled out **on-line** at:

▶ www.fjohss.eu

Should there be problems with the on-line application, please contact the FJOH secretariat at:

▶ fjoh@cea.fr

Deadline for application: **May 13, 2016**

Full registration fees: €2000

Reduced fees: €1000 for fellowship recipients

Information for payment of the fees will be provided upon review of applications.

The fees cover: lectures, class notes, meals and accommodations at the Hotel NOVOTEL Pont-de-l'Arc from August 23 evening to September 2, 2:00 pm.

The fees do not cover travel expenses.

A small number of fellowships will be available for qualified candidates. The fellowship covers the amount of €1000, the same amount of €1000 having to be financed by the applicant or his/her employer. These fellowships are primarily intended for candidates from developing countries. Requests should be motivated.

All applicants are required to provide a short curriculum vitae, which will be used for selection purposes.

The FJOH School considers that the 2016 programme corresponds approximately to 3-4 ECTS credits of post graduate-level course work in Nuclear Engineering.

Selection by the FJOH School Organizers is final.

Aix-en-Provence **France**
August **24** ▶ September **2**

INFORMATION

▶ Key dates

May 13, 2016: Deadline for application.

June 6, 2016: Notification to applicants.

August 23, 2016, 7:00 pm: Welcome to participants with a get-together-dinner at the Hotel NOVOTEL Pont-de-l'Arc.

August 24, 2016, 9:00 am: Start of the school's lectures.

September 2, 2016, 2:00 pm: End of school.

Partial participations are not accepted.



For questions, please contact to mail: fjoh@cea.fr

Deadline for application
May **13**, 2016

INFORMATION

▶ Venue

The School will be held at the Hotel NOVOTEL Pont-de-l'Arc, located in Aix-en-Provence, France, 30 km from the Marseille-Provence airport and 40 km from the CEA Cadarache Research Centre. Bus transportation (free of charge) will be provided from Marseille airport, and from Aix-en-Provence TGV railway-station, on August 23 pm.

Return transportation will be provided on September 2 at 2 pm.

▶ Registration fees

The fees cover: lectures, class notes, excursions, meals and lodging at the Hotel NOVOTEL Pont-de-l'Arc.

The fees do not cover travel expenses.



For more information and for registration
www.fjohss.eu

Frédéric JOLIOT & Otto HAHN

SUMMER SCHOOL ON NUCLEAR REACTORS

"Physics, fuels and systems"

2016



Jointly organized by the
Commissariat à l'Énergie Atomique et aux Énergies Alternatives (France)
and the Karlsruhe Institute of Technology (Germany)

TOMORROW'S LIQUID METAL FAST REACTORS: TOWARDS IMPROVED SAFETY AND PERFORMANCE



Aix-en-Provence **France** August **24** ▶ September **2**



PROGRAMME OUTLINE

TOMORROW'S LIQUID METAL FAST REACTORS: TOWARDS IMPROVED SAFETY AND PERFORMANCE

1. Introduction	4 h
1.1. The Transition from Light Water Reactors to Fast Reactors: Conditions and Foresight (2 h)	J.-F. Sauvage (EDF)
1.2. Status, Gaps and Challenges for Candidate Fast Reactor Concepts (2 h)	S. Monti (IAEA)
2. Core Physics and Thermal-Hydraulics	12 h
2.1. Fundamentals of Fast Reactor Core and Fuel Cycle Physics (3h)	W. Van Rooijen (Fukui Univ.)
2.2. State-of-the-art Reactor Physics Methods for LMFR Core Design with Illustrations taken from the ASTRID/SFR and ELFR/LFR Projects (6h)	G. Grasso (ENEA) D. Verrier (AREVA) B. Fontaine (CEA)
2.3. Advanced Thermal-hydraulics for Liquid-Metal Reactors: Beyond State-of-the-art Methods, Techniques and Experiments (3h)	F. Roelofs (NRG)
3. Fuel, Clad, Structural and Coolant Materials	12 h
3.1. LMFR Fuels: Fundamentals, Performance, and Design Requirements for Traditional (Oxide) and Advanced Fuels (4 h)	T. Wiss (ITU) N. Chauvin (CEA)
3.2. LMFR Clads and Structural Materials: Fundamentals, Performance and Design Requirements for Traditional and Advanced Materials (6h)	A. Courcelle (CEA) A. Kimura (Kyoto Univ.)
3.3. Compatibility of Fast Reactor Structural Materials with Liquid Metal Coolants (2h)	J. Kongs (KIT)
4. Safety Assessment and Licensing	8 h
4.1. Safety Requirements and Methodology: What is New? What are the Trends? (2h)	G. Bruna (IRSN)
4.2. Assessing LFR and SFR Safety: Criteria, Event Scenarios for DBAs and Beyond DBAs, Knowledge Gaps (6h)	K. Mikityuk (PSI) J.-P. Van Dorselaere (IRSN)
5. Group Reflection on Selected Scientific Topics	6 h
Seminar	2 h
Indian Fast Reactor Programme	P. Puthiyavinayagam (IGCAR)

Technical visit of CEA Cadarache R&D facilities

LECTURERS

COORDINATION

DESCRIPTION

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Dr. Luc Vanhoenacker TractebelEng./GDF/Suez - Belgium
Dr. Nicolas Waeckel EdF - France

This 22th session of the Frédéric Joliot/Otto Hahn (FJOH) Summer School on "Nuclear Reactors Physics, Fuels, and Systems" will be held in Aix-en-Provence, France, from **August 24 to September 2, 2016**. This session is entitled Tomorrow's Liquid Metal Fast Reactors: Towards Improved Safety and Performance. It is an advanced course aimed at junior as well as experienced scientists and engineers engaged in the broad field of nuclear sciences, engineering and technologies.

The FJOH-2016 objective is to help the school participants broaden their knowledge of LMFR core and fuel physics, in relation to plant design, optimization and safety studies. The various lectures will therefore show how to "connect the science to the design" in a modern simulation-based interdisciplinary approach of such complex technological systems. Illustrations will be provided from innovative sodium-cooled and lead-cooled demonstrators, such as ASTRID and ELFR, which have already undergone preliminary engineering design and safety studies.

The FJOH-2016 programme covers the following three topics: (i) Core Physics and Thermal-hydraulics; (ii) Fuel, Clad, Structural and Coolant Materials; (iii) Safety Assessment and Licensing. Basic physics phenomena, state-of-the-art methods and modelling techniques will be described. Examples will be provided in order to show how the multiple performance and safety requirements are met, as part of the necessary trade-offs and optimization process.

FJOH-2016 includes plenary lectures, group discussions, seminars, and technical visits. Speakers are invited from internationally leading universities, research and development laboratories, and industry. The lectures are at a post-doctoral level. The participants are assumed to have some basic knowledge on nuclear engineering.

The FJOH-2016 participants will have the opportunity to share their views on specific cross-cutting subjects and open-ended questions, as part of group reflection and critical thinking activities. Time has been set aside in the school schedule for these activities.

This course represents the continuation of the Frédéric Joliot Summer Schools on "Modern Reactor Physics and the Modelling of Complex Systems", which was created by CEA in 1995 to promote knowledge in the field of reactor physics, in a broad sense, and the international exchange of teachers, scientists, engineers and researchers. Beginning in 2004, the scope of the School was extended to include scientific issues related to nuclear fuels. The venues of the FJOH School sessions alternate between Karlsruhe and Aix-en-Provence.

The School's aim is to address the challenges of reactor design and optimal fuel cycles, and to broaden the understanding of theory and experiments.

The programme of each School session is defined by the International FJOH Scientific Board (see below)

The Nuclear Energy Division of CEA and Karlsruhe Institute of Technology jointly organize and sponsor the FJOH Summer School.

2016