

## 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](http://www.fjohss.eu)

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

[fjoh@cea.fr](mailto:fjoh@cea.fr)

**Deadline for application: May 16, 2014**

**Registration fees: € 1900**

**Reduced fees: € 950 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 19 evening to August 29, 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 € 950, the same amount of € 950 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 2014 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 20 > 29**

## INFORMATION

### ▶ Key dates

**May 16, 2014:** Deadline for application.

**June 6, 2014:** Notification to applicants.

**August 19, 2014, 7:00 pm:** Welcome to participants with a get-together-dinner at the Hotel NOVOTEL Pont-de-l'Arc.

**August 20, 2014, 9:00 am:** Start of the school's lectures.

**August 29, 2014, 2:00 pm:** End of school.

Partial participations are not accepted.



For questions, please contact to mail: [fjoh@cea.fr](mailto:fjoh@cea.fr)

Deadline for application  
**May 16, 2014**

## 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 19 pm.

Return transportation will be provided on August 29 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](http://www.fjohss.eu)

Frédéric JOLIOT & Otto HAHN

## SUMMER SCHOOL ON NUCLEAR REACTORS

"Physics, fuels and systems"

# 2014

Jointly organized by the *Commissariat à l'Energie Atomique* (France) and the Karlsruhe Institute of Technology (Germany)

## NUCLEAR REACTORS BRIDGING THE GAP BETWEEN SCIENCE AND INDUSTRY



Aix-en-Provence France August 20 > 29

**KIT**  
Karlsruhe Institute of Technology

DE LA RECHERCHE A L'INDUSTRIE  
**cea**

## PROGRAMME OUTLINE

# NUCLEAR REACTORS BRIDGING THE GAP BETWEEN SCIENCE AND INDUSTRY

|   |  |
|---|--|
| <b>1. Introduction</b>  | <b>3 h</b>   |
| 1.1. Nuclear power plants commercially available today (2 h)  | J. Blomgren (INBEx)                                    |
| 1.2. The life cycle of nuclear energy (1 h)   | B. Bonin (CEA)   |
| <b>2. Light Water Reactor Physics Methods and Data</b>  | <b>15 h</b>  |
| 2.1. Lattice Physics, core modelling: what have we learned, what are the problems yet to be solved? (5 h)               | K. Smith (MIT)   |
| 2.2. Nuclear industry lessons from operating plants, code limitations and practical issues, desirable improvements (6h) | P. Bryce (EdF Energy) & C. Schneidesch (Tractebel Eng) |
| 2.3. Demonstrating core performance via experiments, validation, uncertainty assessment, plant data (4h)                | D. Bernard (CEA) & H.D. Berger (AREVA)                 |
| <b>3. Light Water Reactor Fuels and Structural Materials</b>  | <b>15 h</b>  |
| 3.1. Fundamentals of materials science and radiation damage (5 h)   | A. Moeslang (KIT) & G. Was (University of Michigan)    |
| 3.2. Materials degradation in a reactor: Industrial issues, code limitations, ageing management (4 h)                   | P. Efsing (Vattenfall/KTH) & U. Ilg (ENBW)             |
| 3.3. R&D on nuclear fuel : a good way to address safety and reliability related issues (6 h)                            | J. Noirot (CEA) & N. Waeckel (EDF/SEPTEN)              |
| <b>4. Group Reflection on Selected Scientific Topics</b>  | <b>6 h</b>   |
| <b>Seminar</b>  | <b>2 h</b>   |
| Modern Reactor Physics : Back to the Future (1 h)   | M. Salvatores (Consultant INL)                         |
| Moving from the world of material science into the world of nuclear technology (1 h)                                    | F. Tuomisto (Aalto Univ.)                              |

### Technical visits of CEA Cadarache R&D facilities

## LECTURERS

## COORDINATION

## DESCRIPTION

### HONORARY DIRECTORS

**Prof. Dr. Massimo Salvatores**  
School Honorary Director

**Prof. Dr. Dan Gabriel Cacuci**  
School Honorary Director

### EXECUTIVE BUREAU

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**This 20<sup>th</sup> 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 20 to August 29, 2014**. This session is entitled Nuclear Reactors – Bridging the Gap between Science and Industry. It is aimed at junior as well as experienced scientists and engineers engaged in the broad field of nuclear sciences, engineering and technologies.

FJOH-2014 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 FJOH-2014 programme covers the following two topics: (i) LWR Physics Methods and Data; and (ii) LWR Fuels and Structural Materials. Experts in those two fields will describe physics phenomena, state-of-the-art modelling methods, validation experiments and basic data. Other specialists will discuss method implementation in actual reactors, measured performance, lessons learned, practical limitations and expected progress. The first set of lectures will emphasize scientific considerations, while the second set will emphasize industrial issues, in a complementary fashion. The FJOH-2014 objective is to help the school participants develop a good understanding of "where we stand" and where R&D efforts should be most effective at delivering measurable advances.

The FJOH-2014 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 Karlsruhe Institute of Technology and the Nuclear Energy Division of CEA jointly organize and sponsor the FJOH Summer School.

### FJOH Scientific Board members

**Prof. Jan Blomgren** INBEx - Sweden  
**Dr. Ron Cameron** OECD - International  
**Prof. Francisco Fernandez** CSN - Spain  
**Prof. Michel Giot** UCL - Belgium  
**Prof. Waclaw Gudowski** RIT - Sweden  
**Dr. Kevin Hesketh** NNL - UK  
**Prof. Jan Leen Kloosterman** Univ. Delft - The Netherlands  
**Prof. Rudy Konings** JRC/ITU & Univ. Delft - Germany  
**Dr. Alex Mueller** CNRS - France  
**Dr. Stefan Niessen** AREVA - Germany  
**Dr. Daniel Parrot** CEA - France

**Prof. Horst-Michael Prasser** ETHZ - Switzerland  
**Prof. Piero Ravetto** Politecnico di Torino - Italy  
**Prof. Richard Sanchez** CEA - France  
**Dr. Martin Sonnenkalb** GRS - Germany  
**Prof. Vladimir Slugen** Slovak Univ. of Tech. & ENS - Slovakia  
**Dr. Walter Tromm** KIT - Germany  
**Dr. Harri Tuomisto** Fortum Power - Finland  
**Dr. Luc Vanhoenacker** Tractebel Eng. - GDF-Suez - Belgium  
**Prof. David Weaver** Univ. Birmingham - UK  
**Prof. Frank-Peter Weiss** GRS - Germany

2014