

## APPLICATION

Applications should be submitted by filling out the on-line form at:  
[www.fjohss.eu](http://www.fjohss.eu)

Should there be any problem with the on-line registration, please contact:

**Ms I. Schwartz**  
**Karlsruhe Institute of Technology, INR**  
76344 Eggenstein-Leopoldshafen, Germany  
Phone: +49 (0) 721 6082 2552  
Fax: +49 (0) 721 6082 3718  
[ingeborg.schwartz@kit.edu](mailto:ingeborg.schwartz@kit.edu)

**Deadline for application: May 2, 2011**

**Registration fees: EUR 1700**

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

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

A very limited number of fellowships will be available for qualified candidates. Fellowships are primarily intended for students and applicants from developing countries. A fellowship covers the amount of EUR 1000, which leaves the remaining amount of EUR 700 to be financed by the applicant's organization. Requests should be motivated.

Selection by the FJOH School Organizers is final.

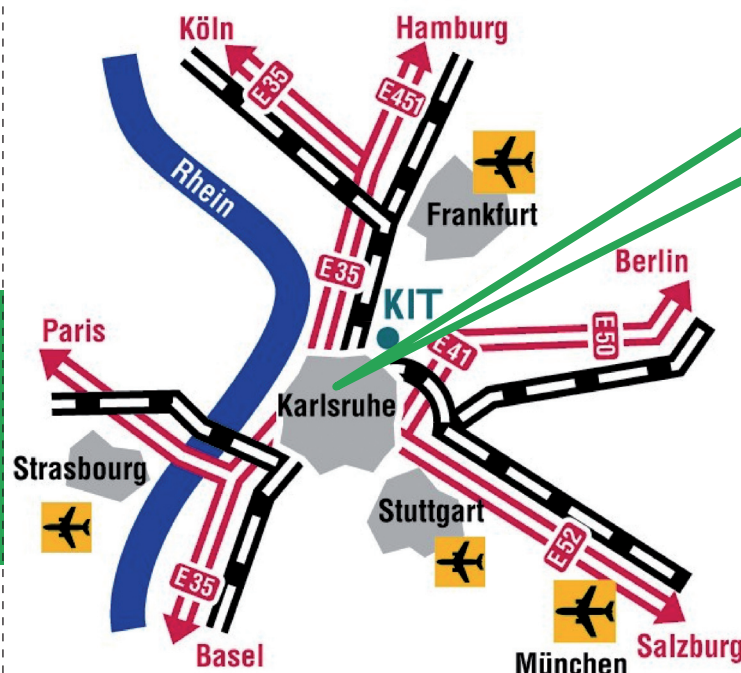
The FJOH School considers that the 2011 programme corresponds approximately to 3-4 ECTS credits of post graduate-level course work in Nuclear Engineering.

**Deadline for application**  
**May 2, 2011**

## INFORMATION

### Venue

The School will be held at the Akademie Hotel Karlsruhe, about 4 km from downtown Karlsruhe, Baden-Württemberg, Germany. Partial participations are not accepted.



### Registration fees

The fees cover: lectures, class notes, excursions, meals and lodging at the "Akademie Hotel Karlsruhe".

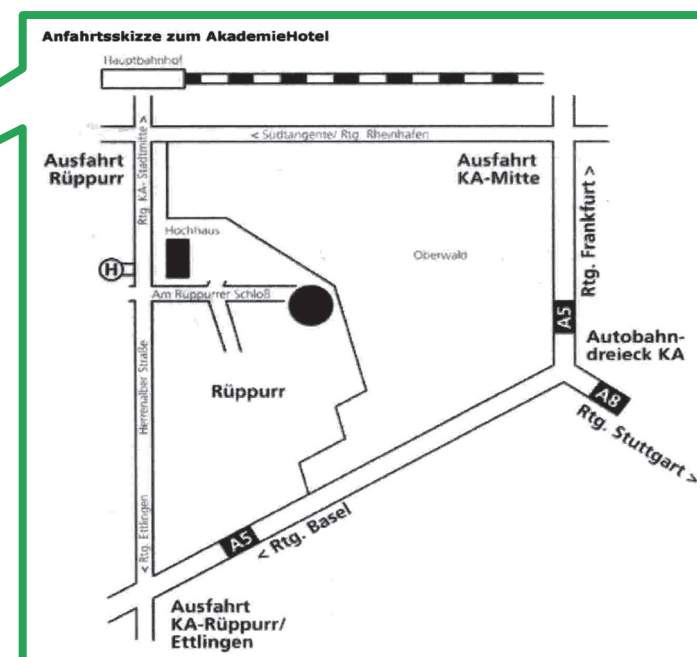
**The fees do not cover travel expenses.**

The school will start on August 24, 2011, 7:00 pm with a get-together-dinner at the "Akademie Hotel Karlsruhe" and will end on September 2, 2011, 1:00 pm.

**Karlsruhe Germany**  
**August 24 > September 2**

## INFORMATION

► Application deadline **May 2, 2011**



For questions, please contact

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For more information, please visit our web site  
<http://www.fjohss.eu>

**Frédéric JOLIOT & Otto HAHN**

**SUMMER SCHOOL  
ON NUCLEAR REACTORS  
PHYSICS, FUELS AND  
SYSTEMS**

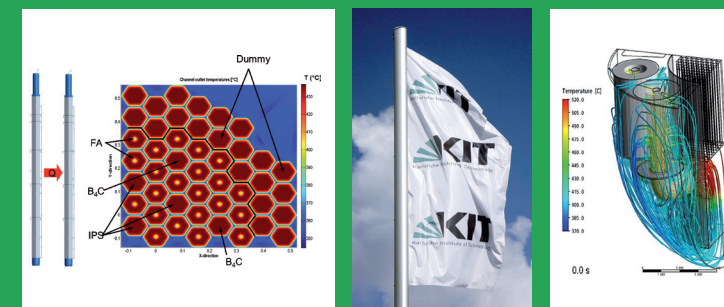
**2011**

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



**HIGH-FIDELITY  
MODELLING FOR NUCLEAR  
REACTORS: CHALLENGES  
AND PROSPECTS**

Karlsruhe Institute of Technology



**Karlsruhe Germany August 24 > September 2**

**KIT**  
Karlsruhe Institute of Technology

**cea**  
énergie atomique • énergies alternatives

PROGRAMME OUTLINE

“HIGH-FIDELITY MODELLING FOR NUCLEAR REACTORS: CHALLENGES AND PROSPECTS”

<b>1. Introduction</b>	Perspectives and challenges in advanced modelling: State of the art, progress in design, operation, safety margins	2h
<b>2. Mechanics</b>		
2.1 Thermal-hydraulics		
2.1.1 Thermal-hydraulics for reactor applications and current state of the art codes		3h
2.1.2 Two-phase flow modelling and simulation		2h
2.2 Structural mechanics		
2.2.1 In-vessel components and fluid-structure interactions		3h
2.2.2 Plant and seismic aspects		2h
<b>3. Neutronics &amp; Core Physics</b>		
3.1 Introduction and current code capabilities		2h
3.2 Monte Carlo methods		
3.2.1 State-of-the art and advanced features		2h
3.2.2 Whole core simulation and advanced applications		2h
3.3. Deterministic Methods		
3.3.1 Fundamentals, progress and limitations		2h
3.3.2 Time-dependent methods and transient analyses		2h
<b>4. Fuels and materials</b>		
4.1 Radiation damage simulations & requirements for structural materials		
4.1.1 Introduction and current modelling capabilities		2h
4.1.2 Multi-scale modelling		3h
4.2 Fuel behaviour modelling		
4.2.1 Fuel performance modelling: current approach and model capabilities		2h
4.2.2 Multi-scale modelling of fuels – From the atom to the mesoscopic scale		3h
<b>5. Multi physics and uncertainty analysis</b>		
5.1 From best-estimate tools to direct coupling approaches		2h
5.2 Advanced multi-physics using HPC capabilities		2h
5.3 Sensitivity and evaluation for neutronics-thermohydraulics coupled solutions		2h

**Seminar on the use of HPCs for applications other than reactors:**  
The challenges of weather forecasting

**Technical Visit: AREVA LWR experimental facilities at Karlstein**

LECTURERS

<b>Topic 1</b>	<b>Prof. Dr. P. Turinsky</b> (North Carolina State University, USA)
<b>Topic 2</b>	
2.1.1	<b>Prof. Dr. M. Giot</b> (Université Catholique de Louvain, Belgium)
2.1.2	<b>Dr. M. Boucker</b> (EDF, France)
2.2.1	<b>Dr. B. Collard</b> (CEA, France)
2.2.2	<b>Dr. F. Voldoire</b> (EDF, France)
<b>Topic 3</b>	
3.1	<b>Prof. Dr. P. Ravetto</b> (Politecnico di Torino, Italy)
3.2.1	<b>Dr. J. Leppänen</b> (VTT, Finland)
3.2.2	<b>Dr. A. Hogenbirk</b> (Nuclear Research and Consultancy Group, NRG, Netherlands)
3.3.1	<b>Prof. Dr. E. Larsen</b> (University of Michigan, USA)
3.3.2	<b>Prof. Dr. E. Mund</b> (Université Libre de Bruxelles, Belgium)
<b>Topic 4</b>	
4.1.1	<b>Dr. P. Vladimirov</b> (KIT Campus Nord, Germany)
4.1.2	<b>Prof. Dr. C. Becquart</b> (Université de Lille, France)
4.2.1	<b>Dr. P. Van Uffelen</b> (ITU, Germany)
4.2.2	<b>Dr. M. Bertolus</b> (CEA Cadarache, France)
<b>Topic 5</b>	
5.1	<b>Prof. Dr. K. Ivanov</b> (KIT Campus Nord, Germany)
5.2	<b>Prof. Dr. T. Downar</b> (University of Michigan, USA)
5.3	<b>Prof. Dr. R. Macián-Juan</b> (Technische Universität München, Germany)
<b>Seminar</b>	<b>Prof. Dr. Ch. Kottmeier</b> (KIT Campus Nord, Germany)

COORDINATION

HONORARY DIRECTORS	
<b>Prof. Dr. D. G. Cacuci</b> Karlsruhe Institute of Technology CS, Karlsruhe/Germany dan.cacuci@kit.edu	<b>Prof. Dr. M. Salvatores</b> Research Director, Scientific Advisor Nuclear Energy Division DEN/DIR, CEA/Cadarache, France massimo.salvatores@cea.fr
EXECUTIVE BUREAU	
<b>For Karlsruhe Institute of Technology</b> <b>Director: Prof. Dr. R. Stieglitz</b> INR and IFRT, Head Karlsruhe Institute of Technology, Germany Phone: +49 (0)721 6082 2550 robert.stieglitz@kit.edu	<b>For Commissariat à l'Energie Atomique et aux Energies Alternatives</b> <b>Director: Dr. R. Jacqmin</b> Research Director DEN/DER, CEA/Cadarache, France Phone: +33 (0)4 4225 3136 robert.jacqmin@cea.fr
<b>Co-Director: Dr. A. Möslang</b> Research Director KIT CN, Germany anton.moeslang@kit.edu	<b>Co-Director: Dr. C. Valot</b> DEN/DEC, CEA/Cadarache, France Phone: +33 (0)4 4225 2137 carole.valot@cea.fr
	<b>Co-Director: Dr. H. Safa</b> DEN/DS, CEA/Saclay, France Phone: +33 (0)1 6908 9955 henri.safa@cea.fr

SCIENTIFIC SECRETARIAT	
<b>Dr. U. Fischer</b> KIT CN, Germany Phone: +49 (0)721 6082 3407 ulrich.fischer@kit.edu	<b>Dr. D. Paul</b> DEN/DEC, CEA/Cadarache, France Phone: +33 (0)4 4225 3016 didier.paul@cea.fr
<b>Dr. V. H. Sánchez Espinoza</b> KIT CN, Germany Phone: +49 (0)721 6082 2283 victor.sanchez@kit.edu	<b>Dr. C. Vaglio-Gaudard</b> DEN/DER, CEA/Cadarache, France Phone: +33 (0)4 4225 2251 claire.vaglio-gaudard@cea.fr

SECRETARIAT	
<b>Ms I. Schwartz</b> Karlsruhe Institute of Technology, Institute for Neutron Physics and Reactor Technology (INR) 76344 Eggenstein-Leopoldshafen Germany Phone: +49 (0) 721 6082 2552 Fax: +49 (0) 721 6082 3718 ingeborg.schwartz@kit.edu	<b>FJOH Secretariat</b> CEA/Cadarache, France C2A - Bât. 155 13108 Saint-Paul-Lez-Durance France

DESCRIPTION

This 17<sup>th</sup> session of the Frédéric Joliot/Otto Hahn (FJ/OH) Summer School on "Nuclear Reactors Physics, Fuels, and Systems" will be held in Karlsruhe, Germany, from **August 24 to September 2, 2011**. This session is dedicated to high-fidelity modelling of nuclear reactors. The course main objective is to describe the benefits brought about by high-performance simulations, as a result of more detailed modelling of complex phenomena taking place in reactor cores, nuclear components and systems, especially in a multi-physics approach. Another objective of the programme is to show that large computing power alone cannot overcome some basic physics or model limitations, especially when experimental data are lacking.

The FJOH-2011 participants will learn about the perspectives and challenges of advanced modelling for reactor applications: state-of-the-art thermal hydraulics and structural mechanics, neutron and core physics modelling capabilities (Monte Carlo and deterministic), fuel and material multi-scale simulations and validation, as well as multi-physics and uncertainty analysis.

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 young as well as experienced teachers, scientists, engineers and researchers. The venues of the FJ/OH School sessions alternate between Karlsruhe and Aix-en-Provence.

Beginning in 2004, the scope of the School was extended to include scientific issues related to nuclear fuels.

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.

Lecturers are invited from internationally leading universities, research and development laboratories, and industry. The lectures are primarily intended for post-doctoral scientists and engineers engaged in the broad field of nuclear sciences, engineering and technologies.

The programme of each School session is defined by the International FJ/OH Scientific Board (see below).

The Karlsruhe Institute of Technology and the Nuclear Energy Division of CEA jointly organize the FJ/OH Summer School.

The School is sponsored by the CEA Nuclear Energy Division (DEN), the Karlsruhe Institute of Technology (KIT) and the French Institute for Education and Training in Nuclear Science and Technology (INSTN).

FJOH Scientific Board members

<b>Prof. Michel Beauvy</b> (CEA, Cadarache) <b>Prof. Rakesh Chawla</b> (EPFL, Lausanne) <b>Dr. Wolfgang Dams</b> (AREVA NP GmbH, Offenbach) <b>Dr. Jean-Michel Delbecq</b> (Electricité de France, Clamart) <b>Dr. Phillip Finck</b> (Idaho National Laboratory, Idaho Falls) <b>Prof. Michel Giot</b> (Univ. Catholique de Louvain-la-Neuve) <b>Prof. Anthony Goddard</b> (Imperial College, London) <b>Prof. Wacław Gudowski</b> (Royal Inst. of Technology, Sweden) <b>Dr. Didier Haas</b> (EC, JRC, Brussels) <b>Dr. Kevin Hesketh</b> (British Nuclear Fuels Plc., Springfields)	<b>Prof. Jan Leen Kloostermann</b> (Delft University) <b>Dr. Joachim Knebel</b> (Karlsruhe Institute of Technology) <b>Prof. William Martin</b> (University of Michigan, Ann Arbor) <b>Prof. Alex Mueller</b> (CNRS, IN2P3, Orsay) <b>Prof. Yoshiaki Oka</b> (University of Tokyo) <b>Prof. Piero Ravetto</b> (Politecnico di Torino) <b>Dr. Daniel Rippert</b> (CEA, INSTN, Cadarache) <b>Prof. Richard Sanchez</b> (CEA, Saclay) <b>Dr. Anselm Schaefer</b> (ISaR GmbH, Garching) <b>Prof. David Weaver</b> (The University of Birmingham) <b>Prof. Frank-Peter Weiss</b> (GRS, Garching)
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