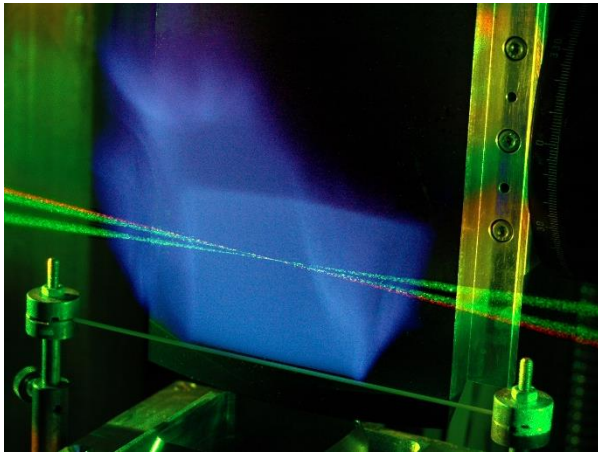




International Combustion Institute Summer School on Near-Wall Reactive Flows

7th – 10th June 2021 – Virtual Summer School



Offered by the International Combustion Institute in cooperation with



SFB/Transregio 150
Turbulente, chemisch reagierende
Mehrphasenströmungen in Wandnähe

DFG Deutsche
Forschungsgemeinschaft

Course Description and Aims

Advances in various engineering and process applications necessitate better understanding of underlying surface processes or near-wall phenomena in concerning systems. High-temperature material synthesis and processing, engine heat transfer and combustion, and chemical process technology (chemical vapor deposition and infiltration, catalytic processes, etc.) are just a few examples. Thereby processes, such as surface reconstruction, surface material damage, material deposition, film growth and material etching, wall-flame interaction, surface reactions and their coupling with chemically reactive flows, have to be addressed.

The course objective is to provide the participants with today's detailed knowledge on

- Turbulence-Chemistry Interaction
- Chemical Kinetics under low temperature conditions
- Near-Wall Reactive Flow Diagnostics
- Heat-Transfer and Turbulent Multiphase-Flows
- Near-Wall Reactive Flow Applications

The ICISS-Summer School in cooperation with TU Darmstadt, KIT, Cerfacs, Sintef and Politecnico Milano is intended to report on the status and perspective of experimental, theoretical, and numerical techniques for understanding, describing, and designing near-wall reactive flows in diverse scientific and engineering fields. It aims furthermore at providing an opportunity for researchers and interested workers to present the state of the art, discuss new challenges and developments, and exchange ideas in the areas of near-wall reactive flows.

Link to [Homepage and Application](#)

Who should attend?

The course is directed towards international graduate students and researchers of mechanical or process engineering, chemistry and physics focusing on the fields of combustion, energy science, turbulent or multiphase flow, fluid mechanics, kinetics, laser diagnostics, thermodynamics or heat transfer.

Summer School - Virtual

The summer school will consist of the following building blocks:

- **Pre-recorded lectures**, available to the attendees two weeks before the Summer School starts (May, 24th, 2021)
- Virtual meeting and interaction between lecturers and attendees **for three hours/day**
- Restriction to 3-4 h/day to enable direct interaction for persons from largely differing time zones
- Enable most efficient use of the **3 h-interaction-time by- Questions/answers** for individual lecturers selected for each day
- **Research Pitches** (5 min presentation/ 5 min discussion) from selected attendees, Research Pitches will be selected during the registration process of the attendees
- **Poster sessions**
- **Mixing events** to support networking, scientific and non-scientific discussions, partly accompanied by lecturers for mentoring

Fees and Registration

The Summer School will be **free of charge**. Please briefly outline your motivation to participate and inform us about the title of your poster or research pitch you would like to present. [Application](#) deadline: April 16th, 2021. A confirmation will be sent to you by email.

Organizing Committee

Prof. Andreas Dreizler

Technische Universität Darmstadt (Germany)

Prof. Olaf Deutschmann

Karlsruhe Institute of Technology (Germany)

Dr. Andrea Gruber

SINTEF Energy Research, Trondheim (Norway)

Prof. Thierry Poinso

National Polytechnic Institute of Toulouse (France)

Prof. Amsini Sadiki

Technische Universität Darmstadt (Germany)

Virtual meeting

Day 1: Monday 7th, June

Tutorial 1: Introduction to Chemical Kinetics (K. Kohse-Höinghaus, Germany)

Lecture 1.1: Chemical Kinetics under low Temperature Conditions (T. Faravelli, Italy)

Lecture 1.2: Heterogeneous Chemical Kinetics (O. Deutschmann, Germany)

Lecture 1.3: Reduction of Chemical Mechanisms (U. Maas, Germany)

Tutorial 2: Numerical Combustion Modelling and Simulation (T. Poinso, France)

Day 2: Tuesday 8th, June

Lecture 2.1: Modelling and Simulation of Near-Wall Reactive Flows – Part I

(C. Frouzakis, Switzerland)

Lecture 2.2: Modelling and Simulation of Near-Wall Reactive Flows – Part II

(C. Hasse, Germany)

Lecture 2.3: Modelling turbulent flow and heat transfer in internal flows of industrial relevance (K. Hanjalić, The Netherlands)

Day 3: Wednesday 9th, June

Tutorial 3: Laser Diagnostics Near Walls

(A. Dreizler, Germany)

Lecture 3.1: Multiscalar Laser Diagnostics (R. Barlow, USA)

Lecture 3.2: Near-Wall Measurements in IC engines (B. Böhm, Germany)

Lecture 3.3: Solar Fuels and New IC engine Concepts (M. Wooldridge, USA)

Day 4: Thursday 10th, June

Tutorial 4: Drop and Spray Impact on Films and Surfaces (C. Tropea, Germany)

Lecture 4.1: Flows over Rough Surfaces (B. Frohnapfel, Germany)

Lecture 4.2: Industrial Perspectives (M. Votsmeier, Germany)

Lecture 4.3: Industrial Perspectives (P. Leick, Germany)

The attendees are invited to have listened to these lectures before and are encouraged to submit questions not later than the day before each session. The questions will be sorted and asked by the Session Chair, while the author(s) of the question turns on her/his video. Follow-up questions will be allowed.

Invited Speakers

Title	Name	Surname	University
Dr.	Robert	Barlow	Sandia National Laboratories, USA
Dr.	Benjamin	Böhm	TU Darmstadt, Germany
Prof.	Olaf	Deutschmann	KIT, Germany
Prof.	Andreas	Dreizler	TU Darmstadt, Germany
Prof.	Tiziano	Faravelli	Politecnico di Milano, Italy
Prof.	Bettina	Frohnapfel	KIT, Germany
Prof.	Christos Emmanouil	Frouzakis	ETH Zürich, Switzerland
Prof.	Kemal	Hanjalić	TU Delft, The Netherlands
Prof.	Christian	Hasse	TU Darmstadt, Germany
Prof.	Katharina	Kohse-Höinghaus	Univ. Bielefeld, Germany
Dr.	Philippe	Leick	Bosch AG, Germany
Prof.	Ulrich	Maas	KIT, Germany
Prof.	Thierry	Poinso	CERFACS, France
Prof.	Cameron	Tropea	TU Darmstadt, Germany
Prof.	Martin	Votsmeier	Umicore AG, Germany
Prof.	Margaret	Wooldridge	Univ. of Michigan, USA