

Open workshop

The spring school is organized as open workshop. It promotes the participants and is open for the interested general public. The spring school is organized as a non-profit event.

Registration fee includes

Printed lecture notes, lectures by invited speakers, software lab mentored by *OpenLB* developers, 5x lunch, 2x dinner (including Spring School dinner), social excursion, all coffee breaks, certificate of participation

Pricing

	Early registration by 10. May 2021	Regular registration
Academia	£ 300	£ 420
Industry	£ 1,300	£ 1,420

Important dates

Spring School 31. May - 04. June 2021

Early registration 10. May 2021

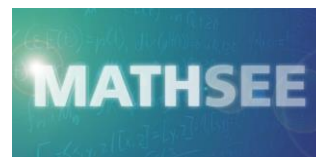
Poster session award

The award is aiming at supporting excellent students working in the field of LBM.

More information

Web: www.openlb.net/spring-school-2021

Email: springschool2021@openlb.net

**Spring School****Lattice Boltzmann Methods**

with *OpenLB* Software Lab

31. May - 4. June 2021

Greenwich, England, United Kingdom

Open Workshop



www.openlb.net/spring-school-2021

Executive committee

Nicolas Hafen (KIT)

Mathias J. Krause (KIT)

Jan E. Marquardt (KIT)

Timothy Reis (GRE)

Choi-Hong Lai (GRE)

Tao Gao (GRE)

Host organizations

Karlsruhe Institute of Technology (KIT)

University of Greenwich (GRE)

OpenLB

The field of Lattice Boltzmann Methods

In recent years, Lattice Boltzmann Methods (LBM) turned into an established numerical tool for computational fluid dynamic (CFD) problems and beyond. The simulation of complex multi-physical problems benefits strongly from the comprehensive mesoscopic modelling underlying LBM and establishes LBM besides traditional numerical methods.

The rapid development in LBM - also driven by the emergence of massive parallel computer infrastructure - enables engineers to solve relevant problems for academia as well as for industry.

Target audience

The expected attendees are developers and researchers, from industry and academia interested to learn theoretical and practical aspects of LBM. The spring school addresses e.g. engineers, computer scientists, mathematicians and physicists as well as Master and PhD students. The course level is beginners in LBM. Based on their interest in CFD, this course provides a collaborative platform for LBM, both for developers and researchers.

Objective of the spring school

The spring school introduces scientists and applicants from industry to the theory of LBM and trains them on practical problems. The first half of the week is dedicated to the theoretical fundamentals of LBM up to ongoing research on selected topics. Followed by mentored training on case studies using *OpenLB* in the second half of the week, the participants gain deep insights into LBM and its applications. Emphasis is placed on the modelling and simulation of particulate fluid flows.

This educational concept is probably unique in the LBM community and offers a comprehensive and personal guided approach to LBM. Participants also benefit from the knowledge exchange during poster session, coffee breaks and an excursion.

Topic overview and preliminary agenda

MONDAY, 31.05.2021

- Morning Registration, hand over spring school documents, introduction, LBM applications
- Afternoon Mesoscopic modeling: from micro to macro scale, LBM introduction, Chapman-Enskog expansion, target equations, boundary conditions, dimensionalisation
- Evening Poster session and dinner

TUESDAY, 01.06.2021

- Morning LBM for turbulent flows, thermal flows, optimal control, radiative transport (light)
- Afternoon LBM for multi-phase and multi-component flows, particulate flows, efficient parallel implementation
- Evening Free, optional: help desk

WEDNESDAY, 02.06.2021

- Morning Introduction *OpenLB*, preliminaries (*Linux*, compile, run in parallel, *ParaView*), converter, Exercise 1
- Afternoon Social event / excursion
- Evening Spring School dinner and poster award

THURSDAY, 03.06.2021

- Morning Setup geometry, meshing, Exercise 2, place LB models, initial and boundary conditions, convergence
- Afternoon Exercise 3, get results: console, *VTK*, images, *Gnuplot*, functor concept, Exercise 4
- Evening Free

FRIDAY, 04.06.2021

- Morning Advanced models, Exercise 5 and 6
- Afternoon Option 1: *OpenLB* for applicants: solve your own problem
- Option 2: *OpenLB* for developers: implement your own LB model

Lab room and requirements

In the computing lab sessions on Thursday and Friday, the participants are trained on practical applications, deploying the open source software *OpenLB*. Particular focus is placed on case studies, which are important to understand and verify the theory presented in the lectures earlier in the spring school. By the help of experienced tutors, the computing lab sessions also enable to set up *OpenLB* simulations for relevant problems. To guaranty personal tutoring and intensive exchange between experienced mentors and novices, the lab is limited to 50 participants.

The attendees are responsible to bring their own laptop equipped with the software

- *GNU c++ compiler 4.8 and higher*
- *OpenMPI 1.6 and higher*
- *ParaView*

Windows users prepare their laptop in advance following the *Technical Report 4* or *5* (www.openlb.net/tech-reports).

Speakers (preliminary)

François Dubois, CNAM Paris, Université Paris-Sud, France

Timm Krüger, University of Edinburgh, United Kingdom

Halim Kusumaatmaja, Durham University, United Kingdom

Nicolas Hafen, Mathias J. Krause, Adrian Kummerländer,

Jan E. Marquardt, Stephan Simonis, Karlsruhe Institute of

Technology, Germany

Timothy Reis, University of Greenwich, United Kingdom