Open workshop

The spring school is organized as open workshop in two parallel sessions: **Option A**dvanced and **Option B**eginners. It promotes the participants and is open for the interested general public. The spring school is organized as a non-profit event. This year's spring school venue is the Friedrich-Alexander University.

Registration fee includes

Lecture notes (theory lecture part: pdf, software lab part: printed), lectures by invited speakers, software tutorial mentored by *OpenLB* developers, daily lunches, 2x dinner (including Spring School dinner), social excursion, daily two coffee breaks, certificate of participation. Several scholarships are available for students (MA or PhD candidates).

Pricing

	Early registration by 14. March 2027	Regular registration
Academia	€ 490	€ 650
Industry	€ 1,900	€ 2,100

Important dates

Spring School	5. - 9. April 2027
Early registration	14. March 2027

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-2027

Email: springschool@openlb.net

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Funded by the European Union

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Funded by the European Union

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Spring School 2027 venue, Friedrich-Alexander-Universität, Erlangen

10th Spring School

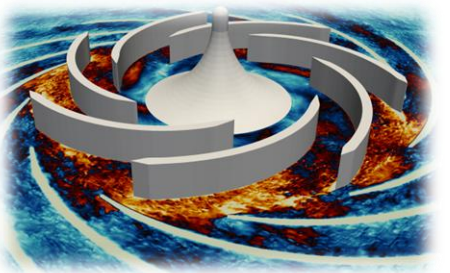
Lattice Boltzmann Methods

with *OpenLB* Software Lab

5. - 9. April 2027

Erlangen, Germany

Open Workshop



www.openlb.net/spring-school-2027

Executive committee

Jens Harting (HIERN/FZJ),
Harald Köstler (FAU),
Stefan Kniesburges (UKER/FAU),
Shota Ito (LBRG/KIT),
Mathias J. Krause (LBRG/KIT),
Tikhon Riazantsev (LBRG/KIT),
Stephan Simonis (ETHZ/KIT)

Host organizations

Friedrich-Alexander-Universität (FAU)

Helmholtz Institute Erlangen-Nürnberg for Renewable Energy (HIERN)

Venue

Friedrich-Alexander-Universität

The field of Lattice Boltzmann Methods

Lattice Boltzmann Methods (LBM) are an established numerical technique for Computational Fluid Dynamics (CFD) and beyond. The simulation of complex multi-physics benefits strongly from the mesoscopic modelling of LBM and positions it next to traditional numerical methods. The rapid development in LBM – also driven by the emergence of massively parallel computing 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 either beginners (**Option B**) or advanced (**Option A**). 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 researchers and users from industry to the theory of LBM and trains them on practical problems. **Option B**: The first half of the week is dedicated to theoretical fundamentals up to ongoing research on selected topics in kinetic theory, scientific computing, LBM, and Partial Differential Equations (PDE). Followed by mentored training on case studies using *OpenLB* in the second half of the week. Emphasis is placed on the modelling and simulation of particulate, multi-component, and turbulent fluid flows. **Option A:** Advanced *OpenLB* users and developers are enabled to solve their own application problems and implement their own solution approaches.

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 the poster session, coffee breaks and an excursion.

Topic overview and preliminary agenda (Option B)

	MONDAY, 05.04.2027
Morning	Registration, introduction, LBM applications, short introduction by all participants
Afternoon	Scientific computing, mesoscopic modeling: kinetic theory, PDE, from micro to macro scale, LBM introduction, Chapman–Enskog expansion, boundary conditions, dimensionalisation
Evening	Poster session and dinner
	TUESDAY, 06.04.2027
Morning	LBM for reactive flows, solids, fluid–structure interaction
Afternoon	LBM for multi-phase and multi-component flows, particulate flows, optimal control, efficient parallel implementation
Evening	Free, optional: Introduction to ParaView and Linux terminal, help desk
	WEDNESDAY, 07.04.2027
Morning	Motivation, core concepts, eight steps of OpenLB
Afternoon	Social event / excursion
Evening	Spring School dinner and poster award
	THURSDAY, 08.04.2027
Morning	Define case, set parameters, create mesh and case, prepare geometry, prepare lattice (part 1)
Afternoon	Prepare lattice (part 2), set initial values, simulate (part 1)
Evening	Simulate (part 2)
	FRIDAY, 09.04.2027
Morning	Advanced models: particle flows, multi-phase models, porous media flows
Afternoon	Bring your own problem: set up your own simulation in OpenLB or implement your own LBM in OpenLB

Preliminary agenda (Option A)

MONDAY TO FRIDAY, 05. - 09.04.2027

Supervised (**MON to WED**) & independent (**THU, FRI**) software lab: *OpenLB* for experienced applicants and developers; participation with all other attendees in short introduction, social event, poster session, dinner, and all coffee as well as lunch breaks.

Software lab and requirements

The participants are trained on practical applications, deploying the open-source software *OpenLB*. **Option B** (**WED to FRI**): Special focus is placed on case studies, which are important to understand and verify the theory presented in the lectures (**MON, TUE**). With the help of experienced tutors, beginners are enabled to set up simulations for relevant problems. **Option A**: Experienced applicants and developers are supervised by tutors (**MON to WED**) to solve their own application problems and/or implement their own LBM. They work independently (**THU, FRI**), through discussions with the tutors are always welcome. To guarantee 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:

- *Up-to-date Linux, macOS, or Windows 10/11*
- *Recent C++ compiler with C++20 support (min.: GNU GCC 13, Clang 19, or Intel ICX 2024.0)*
- *ParaView*
- *MPI (OpenMPI, Intel MPI or MPich)*
- *Optional: OpenMP; NVIDIA / AMD / INTEL GPU*

Windows users should prepare their laptops in advance to enable the Windows Subsystem for Linux (WSL) following the *Technical Report* 5 (www.openlb.net/tech-reports).

Speakers (preliminary)

H. Köstler (FAU), Othmane Aouane (HIERN/FZJ), J. Favier (M2P2/AMU), T. Krüger, H. Kusumaatmaja (University of Edinburgh), T. Reis (University of Greenwich), S. Simonis (ETHZ/KIT), F. Bukreev, S. Ito, F. Kaiser, M.J. Krause, A. Kummerländer (LBRG/KIT)