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GPU Programming Workshop

27 – 30 October 2025

Workshop material:

<https://tinyurl.com/hdli1w25>



Overview



- The workshop is co-organised by Leibniz Supercomputing Centre (LRZ), Erlangen National High Performance Computing Center (NHR@FAU) and NVIDIA Deep Learning Institute (DLI).
- NVIDIA Deep Learning Institute (DLI) offers hands-on training for developers, data scientists, and researchers looking to solve challenging problems with deep learning.
- In this 4-days online workshop you will learn how to accelerate your applications with OpenACC, CUDA C++ and CUDA Python on NVIDIA GPUs.
- Day 1 (OpenACC) is offered outside of the NVIDIA DLI programme.
- The lectures are interleaved with many hands-on sessions using
 - The JupyterHub at NHR@FAU to access the Alex cluster (Day 1), see <https://doc.nhr.fau.de/clusters/alex/>
 - DLI Jupyter Notebooks to access a fully configured GPU-accelerated workstation in the cloud (Day 2 and Day 3).



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DLI Mission: Help the world to solve the most challenging problems using AI and deep learning

We help developers, data scientists and engineers to get started in architecting, optimizing, and deploying neural networks to solve real-world problems in diverse industries such as autonomous vehicles, healthcare, robotics, media & entertainment and game development.

Lecturers

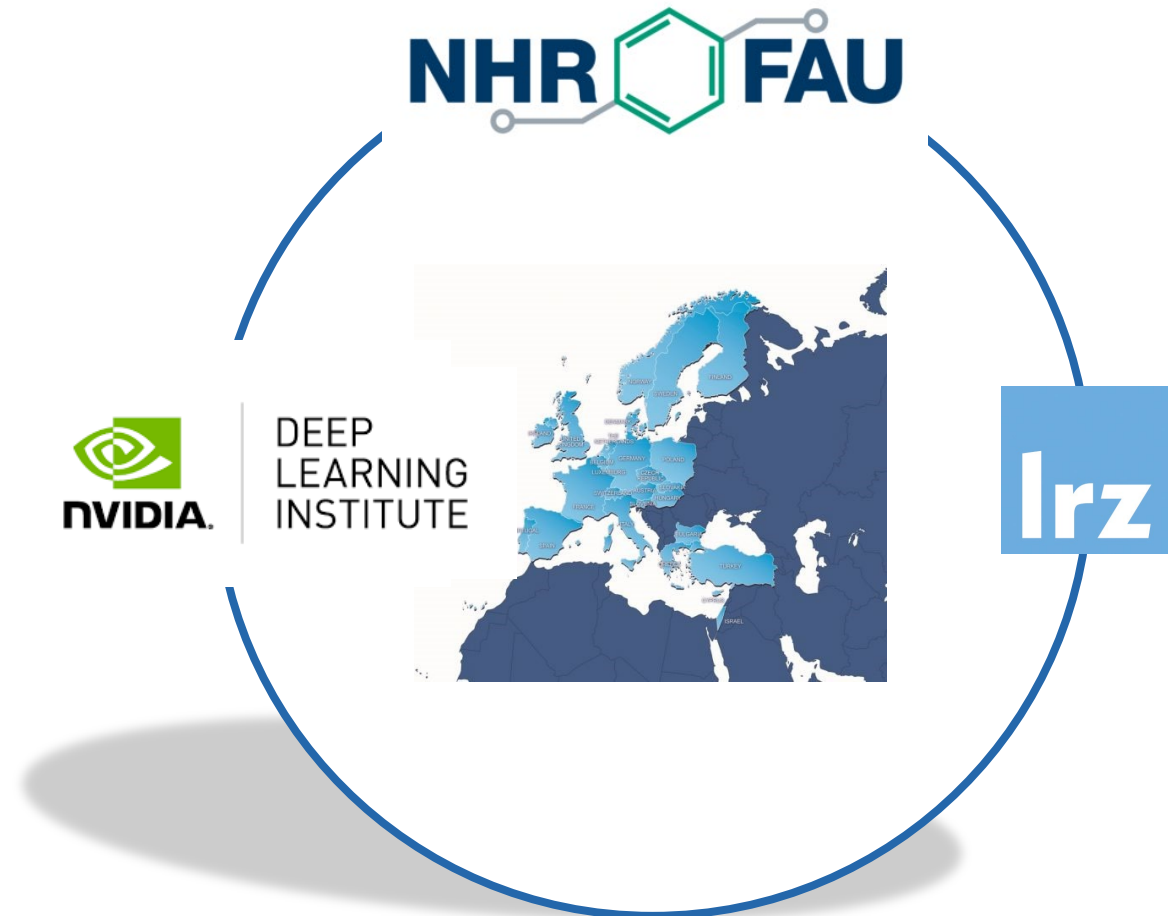


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- **Lecturers:**

- Dr. Momme Allalen (LRZ)
- Dr. Sebastian Kuckuk (NHR@FAU)
- Dr. Volker Weinberg (LRZ)



All instructors are NVIDIA certified University Ambassadors.

1st day:

Fundamentals of Accelerated Computing with OpenACC



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- Learning Objectives:

- Profile and optimize your CPU-only applications to identify hot spots for acceleration.
- Use OpenACC directives to GPU-accelerate your codebase.
- Optimize data movement between the CPU and GPU accelerator.

2nd day:

Fundamentals of Accelerated Computing with CUDA C/C++



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- This lecture provides a comprehensive introduction to general-purpose GPU programming with CUDA.
- You'll learn how to write, compile, and run GPU-accelerated code, leverage CUDA core libraries to harness the power of massive parallelism provided by modern GPU accelerators, optimize memory migration between CPU and GPU, and implement your own algorithms.
- At the end of the lecture, you'll have access to additional resources to create your own GPU-accelerated applications.

3rd day:

Fundamentals of Accelerated Computing with CUDA Python



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- This lecture explores how to use Numba — the just-in-time, type-specialising Python function compiler — to accelerate Python programs to run on massively parallel NVIDIA GPUs. You'll learn how to:
- Use Numba to compile CUDA kernels from NumPy universal functions (ufuncs)
- Use Numba to create and launch custom CUDA kernels
- Apply key GPU memory management techniques
- Upon completion, you'll be able to use Numba to compile and launch CUDA kernels to accelerate your Python applications on NVIDIA GPUs.

4th day: Q&A Session



- Unfortunately, the DLI course "Accelerating CUDA C++ Applications with Multiple GPUs" originally scheduled for the last day has been suspended by NVIDIA.
- Instead, we will offer a Q&A session about GPU programming with CUDA C++, CUDA Python, and OpenACC at 09:00 – 11:00 CET.

Tentative Agenda Day 1: Fundamentals of Accelerated Computing with OpenACC



- 09:00-09:30 Welcome
- 09:30-10:45 Introduction and Profiling
- **10:45-11:00 Coffee Break**
- 11:00-12:00 OpenACC Directives

- **12:00-13:00 Lunch Break**

- 13:00-14:15 GPU Programming
- **14:15-14:30 Coffee Break**
- 14:30-15:30 Data Management
- 15:30-15:45 Optimisations
- 15:45-16:00 Q&A, Final Remarks



All times are in CET

Workshop Webpage



- All slides will be made available during the workshop under:

<https://tinyurl.com/hdli1w25>



- Further information on:

- Agenda
- Training Setup
- Slides
- Documentation



zoom

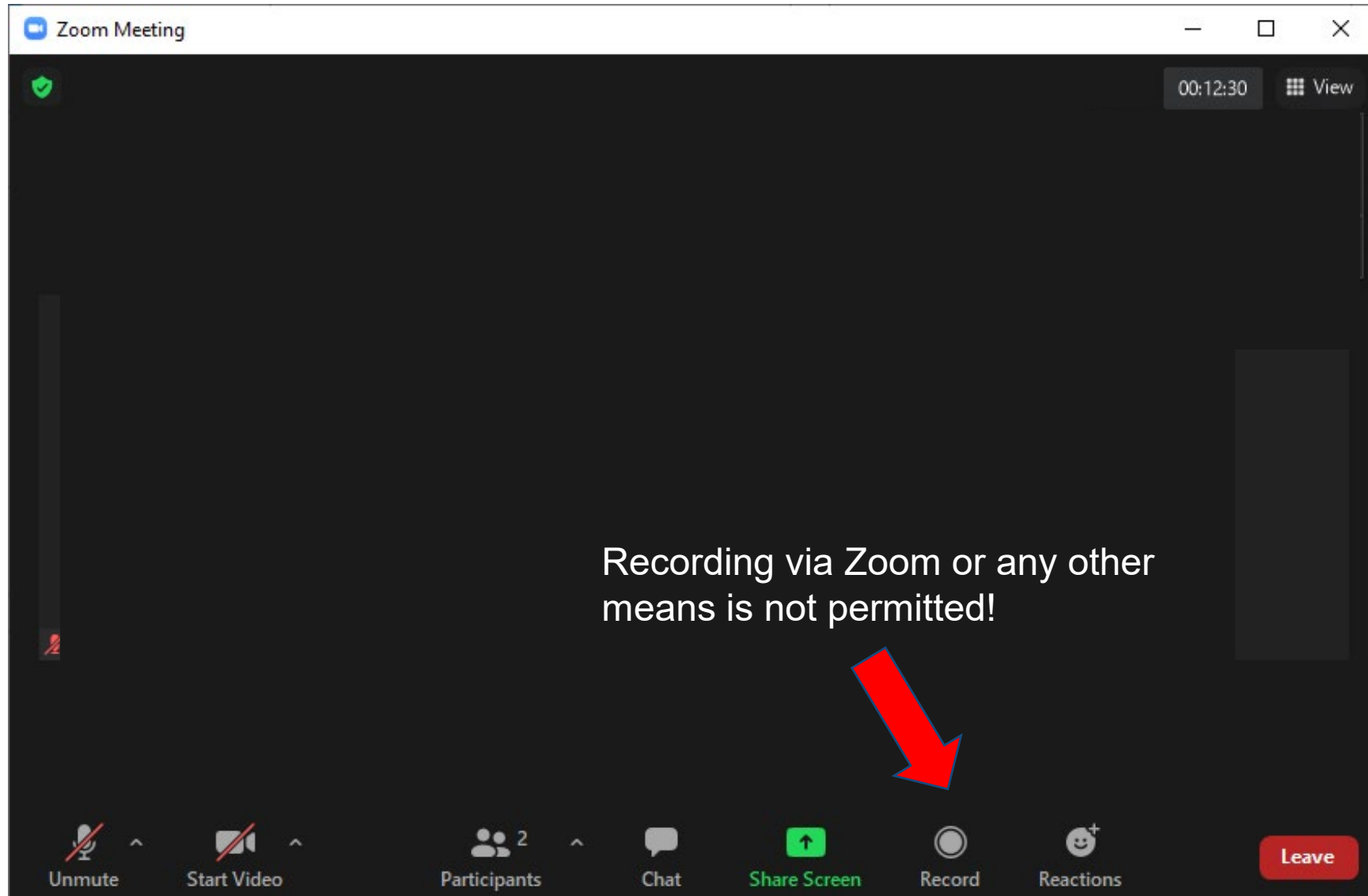
Participants List



Kindly use “<first name> <last name> (<institute>)” as your screenname.

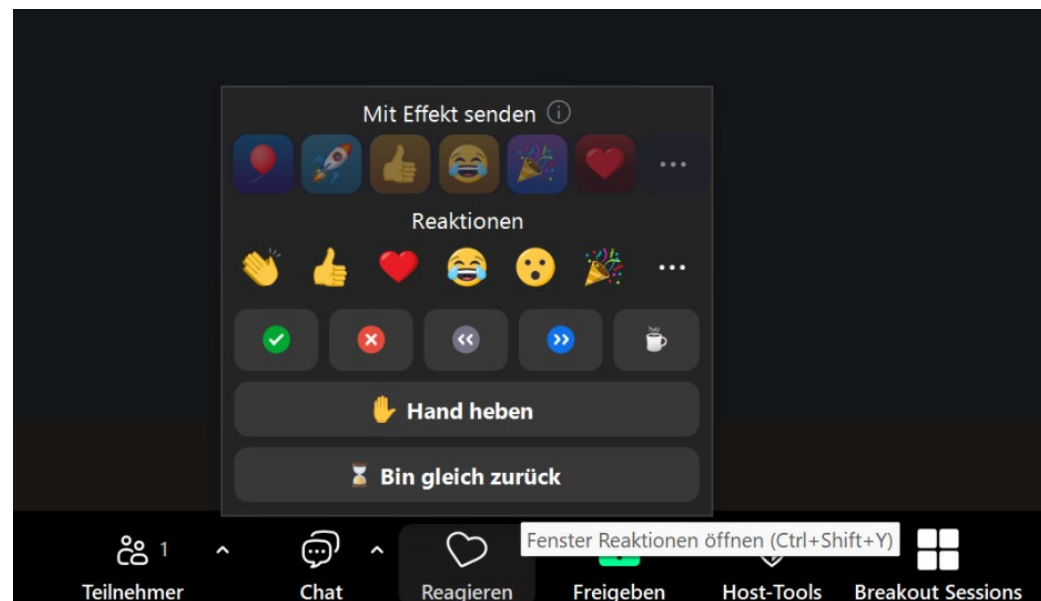
Otherwise you will not receive a certificate of attendance after the course.

The screenshot shows a Zoom Meeting window with a dark theme. The top bar displays 'Zoom Meeting', a green checkmark, a timer at '00:19:17', and a 'View' button. The main area is mostly black. At the bottom, there is a toolbar with icons for 'Unmute', 'Start Video', 'Participants' (with a '2' next to it), 'Chat', 'Share Screen', 'Record', 'Reactions', and a red 'Leave' button. On the right side, a 'Participants (2)' panel is open, showing two entries: 'Volker Wei... (Me)' with an 'Unmute' button and a 'More >' button, and 'Volker Weinberg Backup (Host)' with a muted icon and a video-off icon. A blue-bordered menu is open over the 'More >' button, containing 'Edit Profile Picture' and 'Rename'. A red arrow points from a black box labeled 'Rename Yourself' to the 'Rename' option. A large orange circle with the number '1' is positioned over the 'Participants' icon in the toolbar, with the text 'Open Participants List' and a red arrow pointing down to the 'Participants' icon. A second large orange circle with the number '2' is positioned below the 'Rename Yourself' box.



- Please **raise your hand** if you have questions (of general interest).
- You can also use **chat window** to ask questions.
- If you do not mind, please **show your video when asking questions** to make this course as interactive as possible.
- **Push to Talk:** The Push to Talk feature allows you to remain muted throughout the Zoom meeting and only if you hold down the spacebar you will be unmuted.

- **Instant Feedback:**



And now ...



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Enjoy the workshop!