



# PRACE Course: OpenMP Programming Workshop

ONLINE | 17 – 19 February 2021

# PRACE Training



LRZ as part of the Gauss Centre for Supercomputing (GCS) belongs to the 14 **PRACE Training Centres** that started in 2012-2017-2020:

- Barcelona Supercomputing Center (Spain)
- CINECA Consorzio Interuniversitario (Italy)
- CSC – IT Center for Science Ltd (Finland)
- EPCC at the University of Edinburgh (UK)
- Gauss Centre for Supercomputing (Germany)
- Maison de la Simulation (France)
- GRNET – Greek Research and Technology Network (Greece)
- ICHEC – Irish Centre for High-End Computing (Ireland)
- IT4I – National Supercomputing Center VSB Technical University of Ostrava (Czech Republic)
- SURFsara (The Netherlands)
- TU Wien – VSC Research Center (Austria)
- University ANTWERPEN – VSC & CÉCI (Belgium)
- University of Ljubljana – HPC Center Slovenia (Slovenia)
- Swedish National Infrastructure for Computing (SNIC) (Sweden)



**Mission:** Serve as **European hubs and key drivers of advanced high-quality training** for researchers working in the computational sciences.

<http://www.training.prace-ri.eu/>

# Presenters



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- **Presenters:**

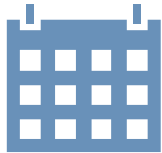
- Dr.-Ing. Michael Klemm (OpenMP ARB, AMD)
- Dr. Christian Terboven (RWTH Aachen)



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# Tentative Schedule



	Day 1	Day 2	Day 3
09:00-10:30 CET		<b>Tasking 1</b> <ul style="list-style-type: none"><li>• Tasking Intro</li><li>• Lab 1</li></ul>	<b>GPUs</b> <ul style="list-style-type: none"><li>• OpenMP for Compute Accelerators</li></ul>
10:45-12:15 CET		<b>Tasking 2</b> <ul style="list-style-type: none"><li>• Taskloop</li><li>• Dependencies</li><li>• Cancellation</li><li>• Lab 2</li></ul>	<b>Tools for Perf. and Correctness</b> <ul style="list-style-type: none"><li>• VI-HPS Tools for Performance</li><li>• VI-HPS Tools for Correctness</li></ul>
13:00-14:45 CET	<b>Introduction to OpenMP</b>	<b>Host Perf.: SIMD</b> <ul style="list-style-type: none"><li>• Vectorisation</li><li>• Lab 3</li></ul>	<b>Misc. OpenMP 5.0 Features</b> <ul style="list-style-type: none"><li>• DOACROSS Loops</li></ul>
15:00-16:00 CET	<b>Hands-on: Introduction to OpenMP</b>	<b>Host Perf.: NUMA</b> <ul style="list-style-type: none"><li>• Memory Access</li><li>• Task Affinity</li><li>• Memory Management</li><li>• Lab 4</li></ul>	<b>Roadmap / Outlook</b> <ul style="list-style-type: none"><li>• Open Discussion</li><li>• OpenMP 5.0 and beyond</li></ul> <p>End: approx. 16:30 CET</p>

# Workshop Webpage



- All slides and exercises will be made available under:

- <https://tinyurl.com/omp-workshop>



- Further information on:

- Agenda
- Slides
- Exercises

PRACE Course: OpenMP Programming Workshop 2021

With the increasing prevalence of multicore processors, shared-memory programming models are essential. OpenMP is a popular, portable, widely supported, and easy-to-use shared-memory model.

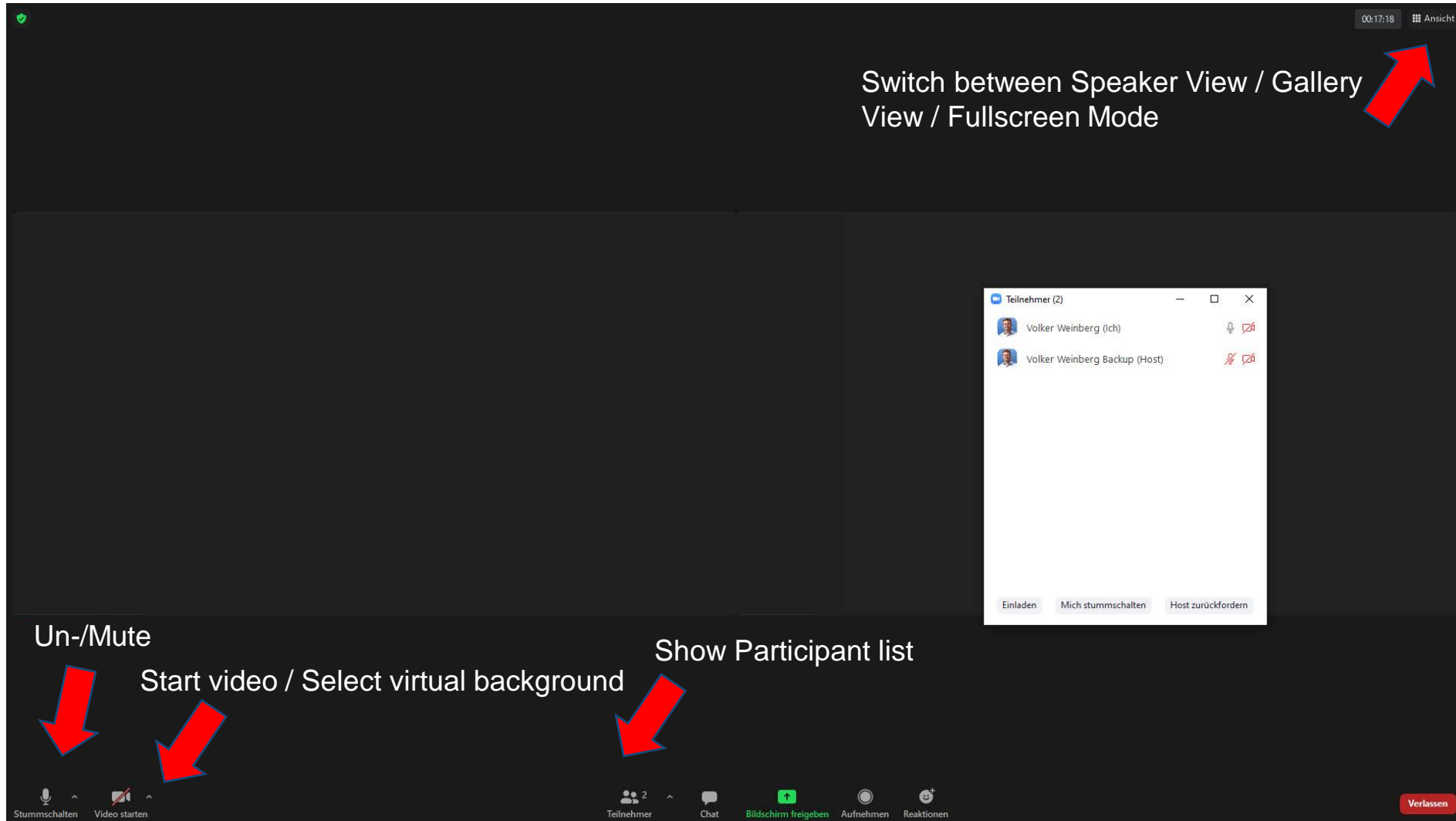
Since its advent in 1997, the OpenMP programming model has proved to be a key driver behind parallel programming for shared-memory architectures. Its powerful and flexible programming model has allowed researchers from various domains to enable parallelism in their applications. Over the more than two decades of its existence, OpenMP has tracked the evolution of hardware and the complexities of software to ensure that it stays as relevant to today's high performance computing community as it was in 1997.

This workshop will cover a wide range of topics, reaching from the basics of OpenMP programming using the "OpenMP Common Core" to really advanced topics. During each day lectures will be mixed with hands-on sessions.

**Tentative Agenda**

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09:00-10:30 CET		<b>Tasking 1</b> <ul style="list-style-type: none"><li>• Tasking Intro</li><li>• Lab 1</li></ul>	<b>GPUs</b> <ul style="list-style-type: none"><li>• OpenMP for Compute Accelerators</li></ul>

- ZOOM help centre has great resources with help articles and videos for getting started:  
<https://support.zoom.us/hc/en-us>.
- You may log in via the app or a browser. We recommend downloading the latest version of the app via  
<https://zoom.us/download> for the best experience.
- You can participate in the workshop without a ZOOM account. You may sign up for a free account at  
<zoom.us/signup>.
- **Join Zoom Meeting (same link for all 3 days)**  
<https://us02web.zoom.us/j/84550049120?pwd=c2tWdDJCQ2VkNUphOFVqVnRpUE00Zz09>
- Meeting ID: 845 5004 9120
- Passcode: 221019
- If you have problems with your computer audio, you can also join by phone:
- Find your local number: <https://us02web.zoom.us/u/kftHQI7q6>



00:17:18 Ansicht

Switch between Speaker View / Gallery View / Fullscreen Mode

Teilnehmer (2)

	Volker Weinberg (Ich)		
	Volker Weinberg Backup (Host)		

Einladen Mich stummschalten Host zurückfordern

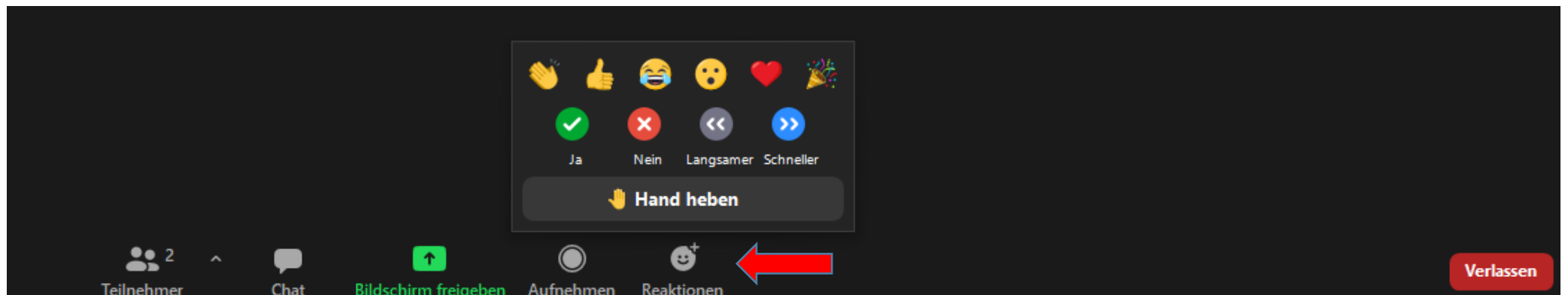
Un-/Mute

Start video / Select virtual background

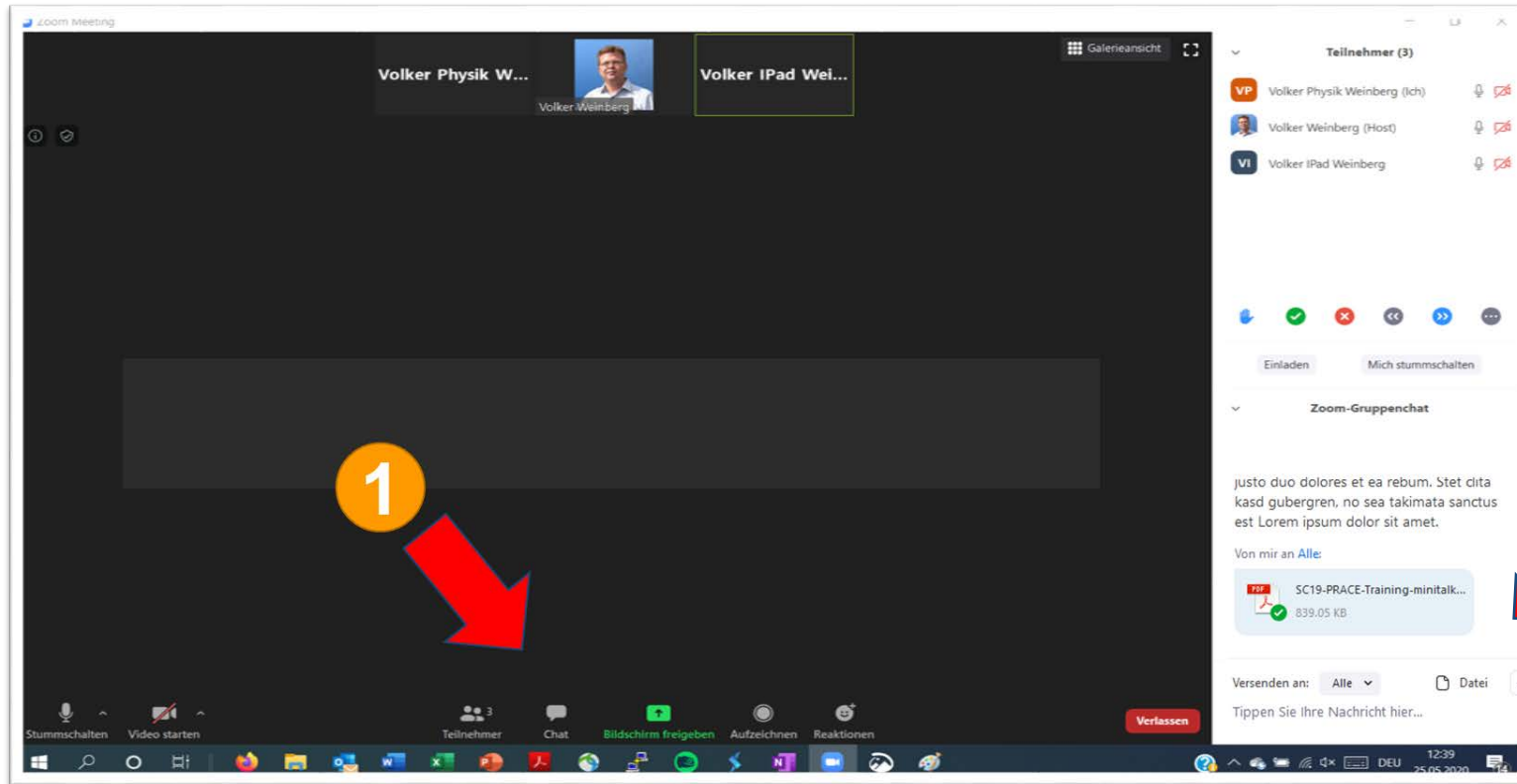
Show Participant list

Stummschalten Video starten Teilnehmer Chat Bildschirm freigeben Aufnehmen Reaktionen Verlassen

- **Raise hand** or **use chat window** to ask questions.
- If you do not mind, please **show your video when asking questions** to make this session as interactive as possible.
- **Push to Talk:** The Push to Talk feature allows you to remain muted throughout your Zoom meeting and hold down the spacebar when you want to be unmuted and talk.
- **Instant Feedback:**







And now ...



**Enjoy the workshop!**