

High-performance computing group «høyytelsesberegninger»

Ambition: Improve the state-of-the-art of various subjects in the research field of *high-performance computing* (**HPC**), to help advance computational science, engineering and AI/ML.

How to make computations larger and faster?

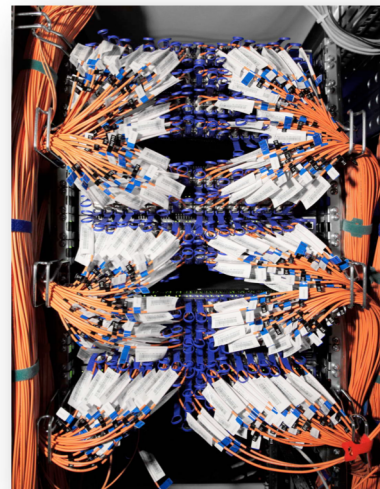
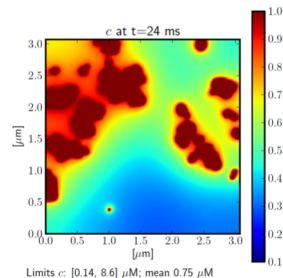
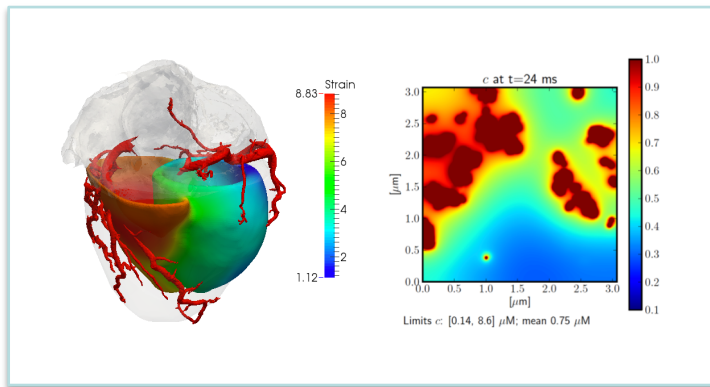


How HPC Is Powering AI, Big Data, and the Future of Innovation

HPC group's research topics

- Parallel programming of heterogeneous computing systems
- Code optimization and performance modeling
- Interconnect technologies
- Enhancement of AI/ML computations
- Physics-based simulations
- Physics-informed AI/ML applications

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Faculties (potential supervisors)

Professors		Adjunct Associate Professors	
			
Xing Cai	Tor Skeie	Håkon Stensland	Joakim Sundnes

<https://www.mn.uio.no/ifi/english/research/groups/hpc/>

We also have a very strong collaboration with
Simula Research Laboratory in Oslo **simula**
<https://www.simula.no>

Master courses taught by HPC group

- **IN4200** High-Performance Computing and Numerical Projects
- **IN4230** Computer Networks
- **IN5031** Protocols and AI for Future Internet
- **IN5050** Programming heterogeneous multi-core architectures

Some available master projects

- [How costly is memory traffic on AMD multicore CPUs?](#)
- [High-performance processing pipelines for realistic heart simulations](#)
- [Faster mesh processing for high-performance scientific computing](#)
- [Improving preparedness for urban flooding with physics-informed machine learning](#)
- [Pushing the Limits of Supercomputing Networks](#)
- [DopplerLog: A Performance Measurement Tool for Composable PCIe Infrastructures](#)
- [MPI over PCI Express](#)
- [Investigating Smart NICs in PCI Express Networks](#)
- [Multi-GPU Communication for Machine Learning over PCI Express](#)
- [Speeding up distributed matrix completion with strategic work division and communication optimization](#)

We can tailor-make master projects!

- New projects co-designed with interested students
- Possible combinations of
 - Programming
 - Code optimization
 - Real-world simulations and/or applications
- We can add mathematical/numerical content if desired
- Contact the potential supervisors!