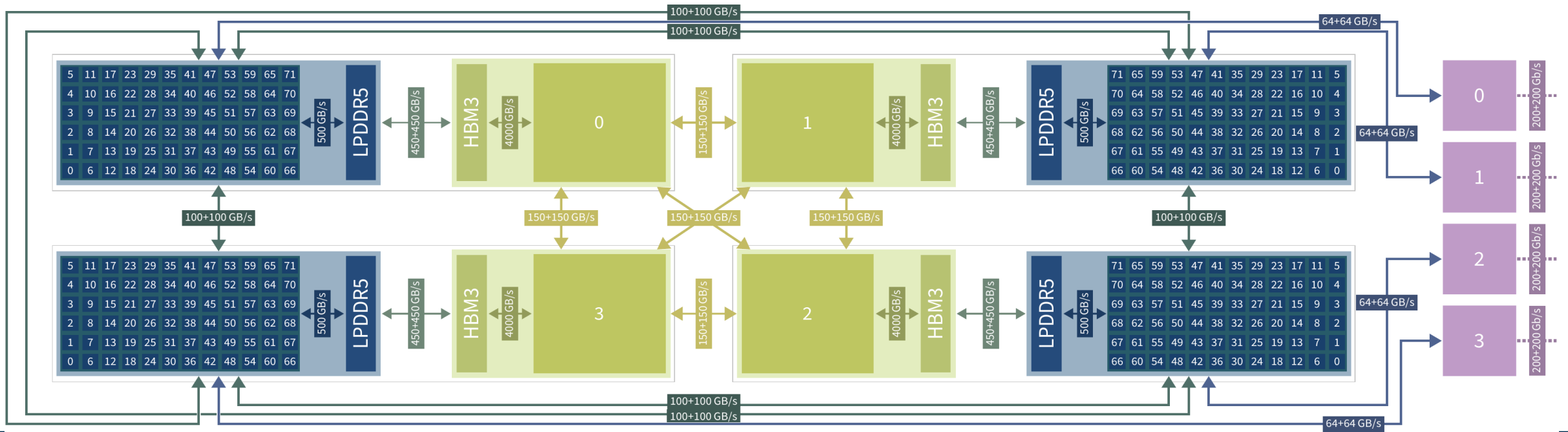




ASTROPHYSICS & JUPITER: FIRST EUROPEAN EXASCALE SUPERCOMPUTER

24.01.2025 | Virgo Meeting | Dr. Jolanta Zjupa (j.zjupa@fz-juelich.de)
Jülich Supercomputing Centre (JSC) / Forschungszentrum Jülich (FZJ)

GCS Gauss Centre for Supercomputing



HLRS – High-Performance Computing Center
Stuttgart



JSC – Jülich Supercomputing Centre at
FZJ – Forschungszentrum Jülich



LRZ – Leibniz Supercomputing Centre,
Garching near Munich



gauss-centre.eu



JSC - Jülich Supercomputing Centre

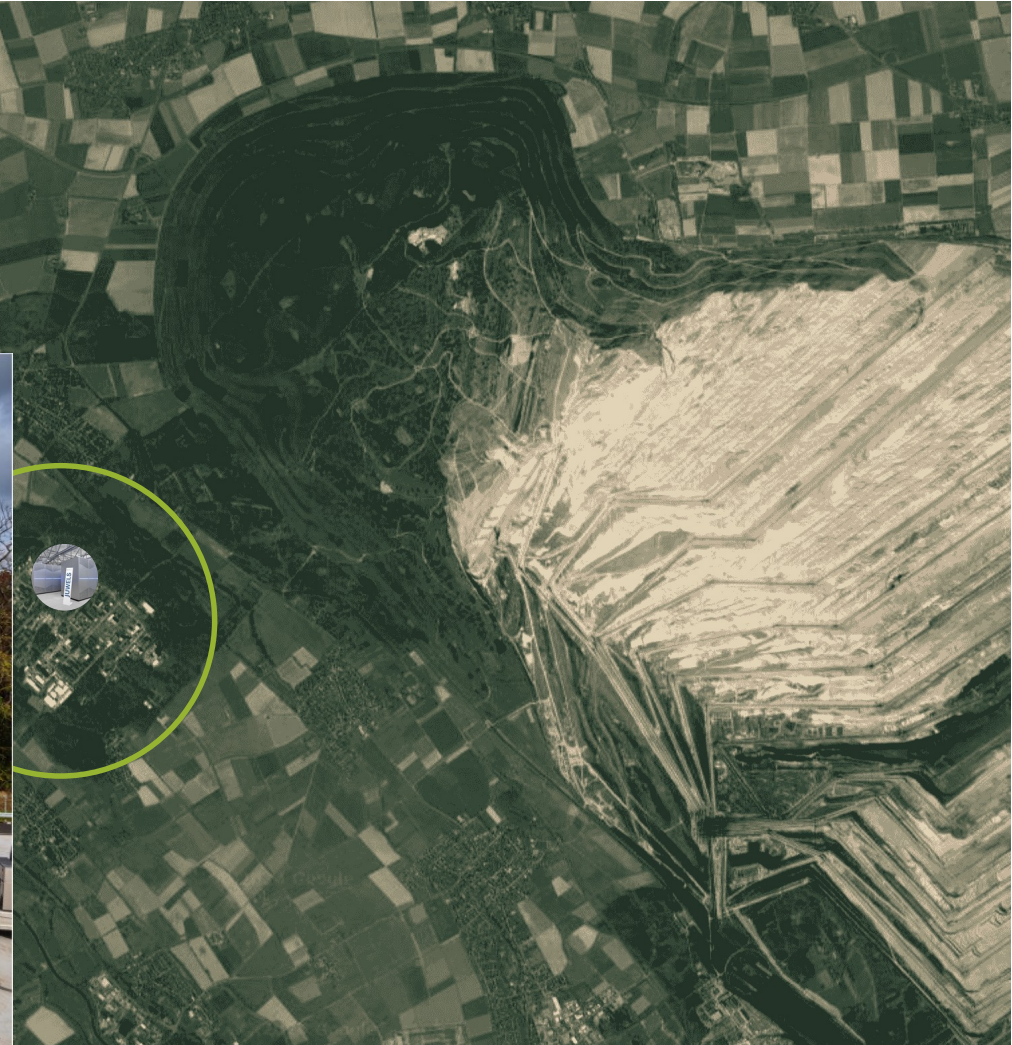


source: google maps

JSC - Jülich Supercomputing Centre

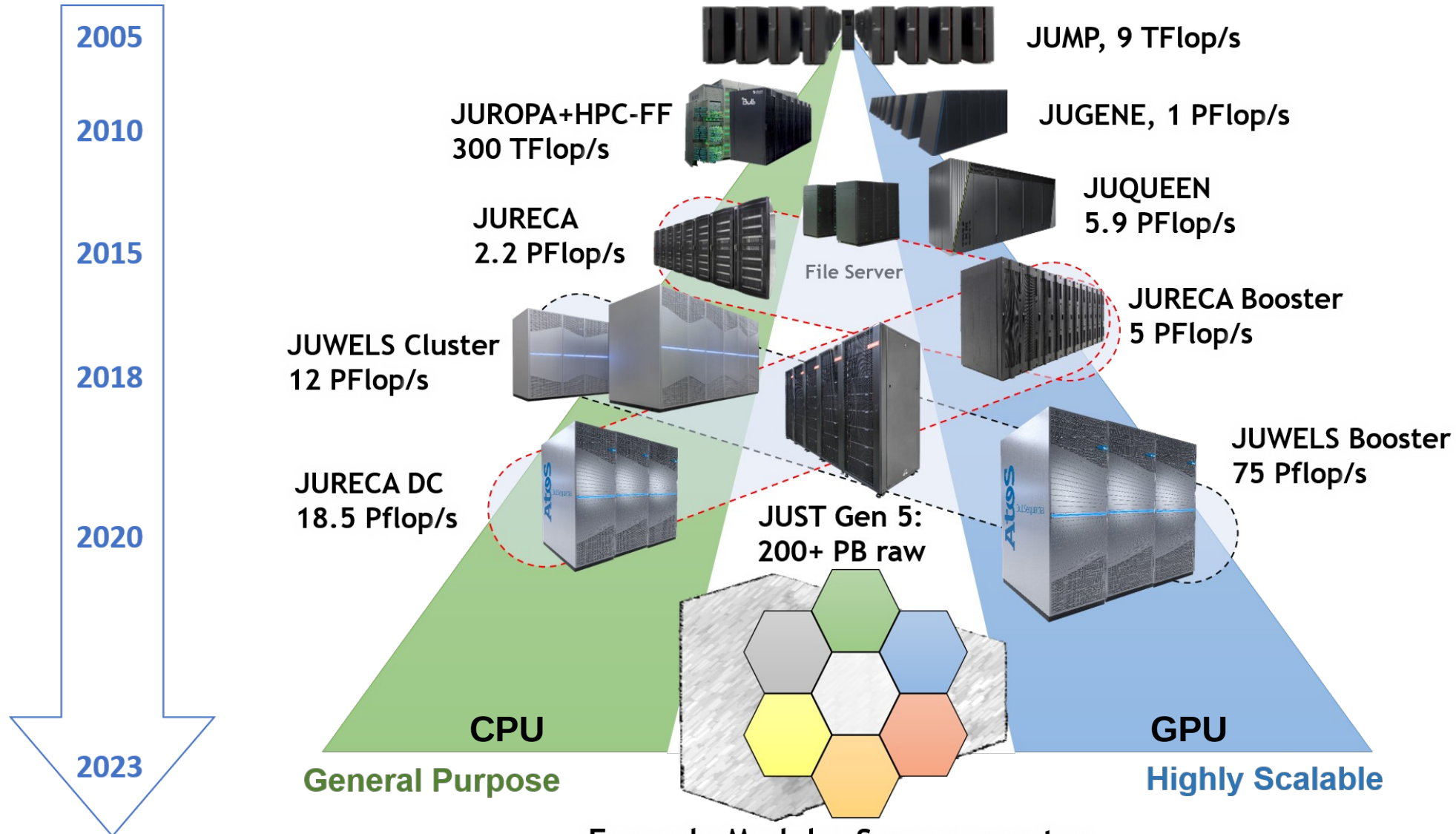


source: Herwig Zilken / FZJ



source: google maps

JSC Supercomputing systems



JUWELS Booster

- 73 PetaFLOP/s performance
- 936 compute nodes
- node: 4 NVIDIA A100 GPUs with 40 GB, 48 cores (2 AMD CPUs), 512 GB DDR4 memory

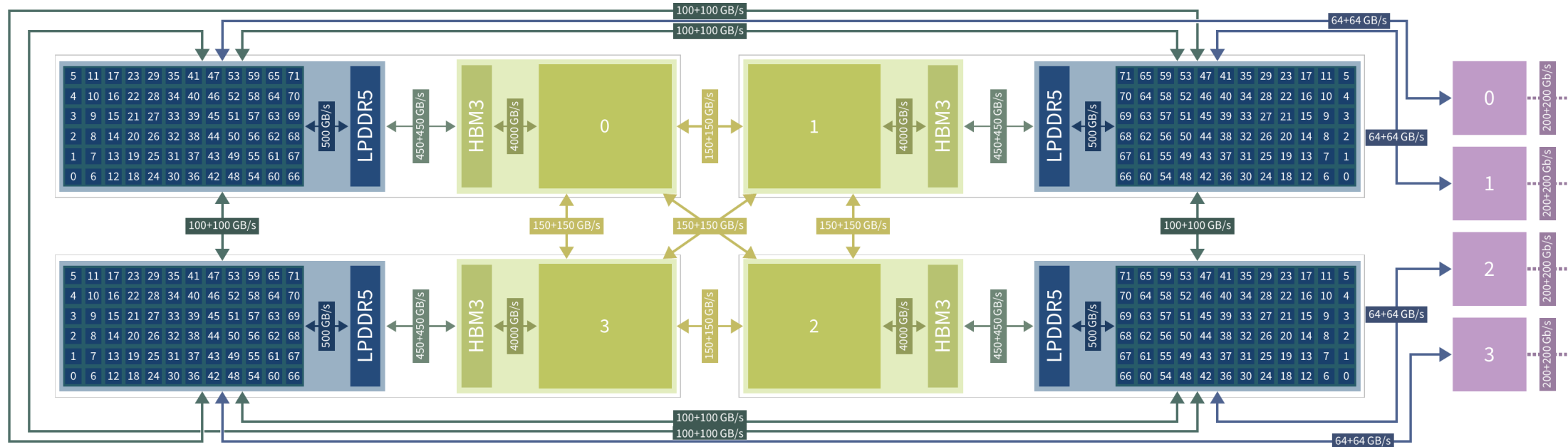
JUWELS Cluster

- 2271 (standard) compute nodes
- node: 48 cores (2 Intel CPUs), 96 GB DDR4 memory
- 240 large memory compute nodes – 192 GB DDR4 memory
- 56 accelerated compute nodes – 4 NVIDIA V100 GPUs with 16 GB



JUPITER Booster

- 1 ExaFLOP/s (FP64, HPL) performance
- ~ 5900 compute nodes
- node: 4 NVIDIA *Grace Hopper* GH200 GPUs, 288 cores (4 CPUs), 480 GB CPU memory (RAM)
NVIDIA *Hopper* H100 GPU: 96 GB memory, NVIDIA *Grace* CPU: 72 ARM cores, 120 GB memory



fz-juelich.de/en/ias/jsc/jupiter/tech

Getting access to JUPITER resources

➤ 50% European (EuroHPC) share

calls: eurohpc-ju.europa.eu/access-our-supercomputers/eurohpc-access-calls_en

development, benchmarking, AI & data-intensive - open now

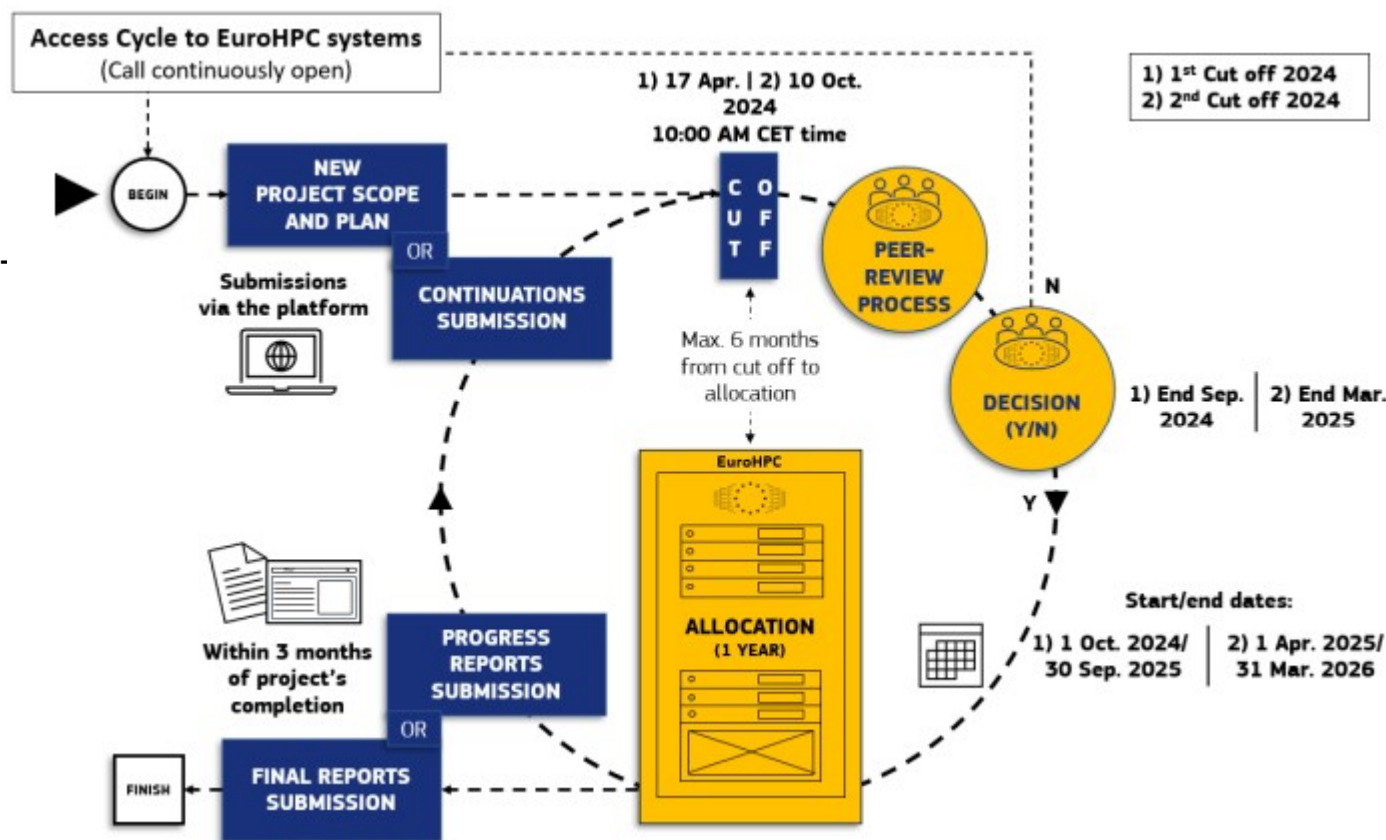
regular, extreme scale – open Feb & Aug (closes April & Oct, compute time from Oct & April)

➤ 50% national (GCS) share

calls: gauss-centre.eu/news/gcs-call-2025-1-for-large-scale-projects-now-open-call-33

fact sheet (incl. link to apply): jards.gauss-centre.eu/PublicFiles/FactSheets/FactSheet-GCS-NIC-JUPITER.pdf

regular, extreme scale – open now



eurohpc-ju.europa.eu/eurohpc-ju-call-proposals-extreme-scale-access-mode_en

Getting access to JSC resources

	Test project	Compute project	Data project
Apply	anytime	twice a year: mid Feb/Aug <i>next deadline:</i> 17 February 2025, 17:00 CEST	anytime
Compute time	~ (5.-20.) 000 core-h		none
Duration	6 months	1 year	1 year

- fz-juelich.de/en/ias/jsc/systems/supercomputers/call-for-applications-for-test-projects-with-jsc-supercomputing-and-support-resources

➤ In awaiting: test projects on JEDI test system (48 nodes)

or astrophysics / JURECA only:

results.punch4nfdi.de/?md=/docs/Compute/Computer_Resources/compute-projects.md

- fz-juelich.de/en/ias/jsc/systems/supercomputers/apply-for-computing-time
- fz-juelich.de/en/ias/jsc/systems/supercomputers/call-for-proposals
- fz-juelich.de/en/ias/jsc/services/data-services/data-projects

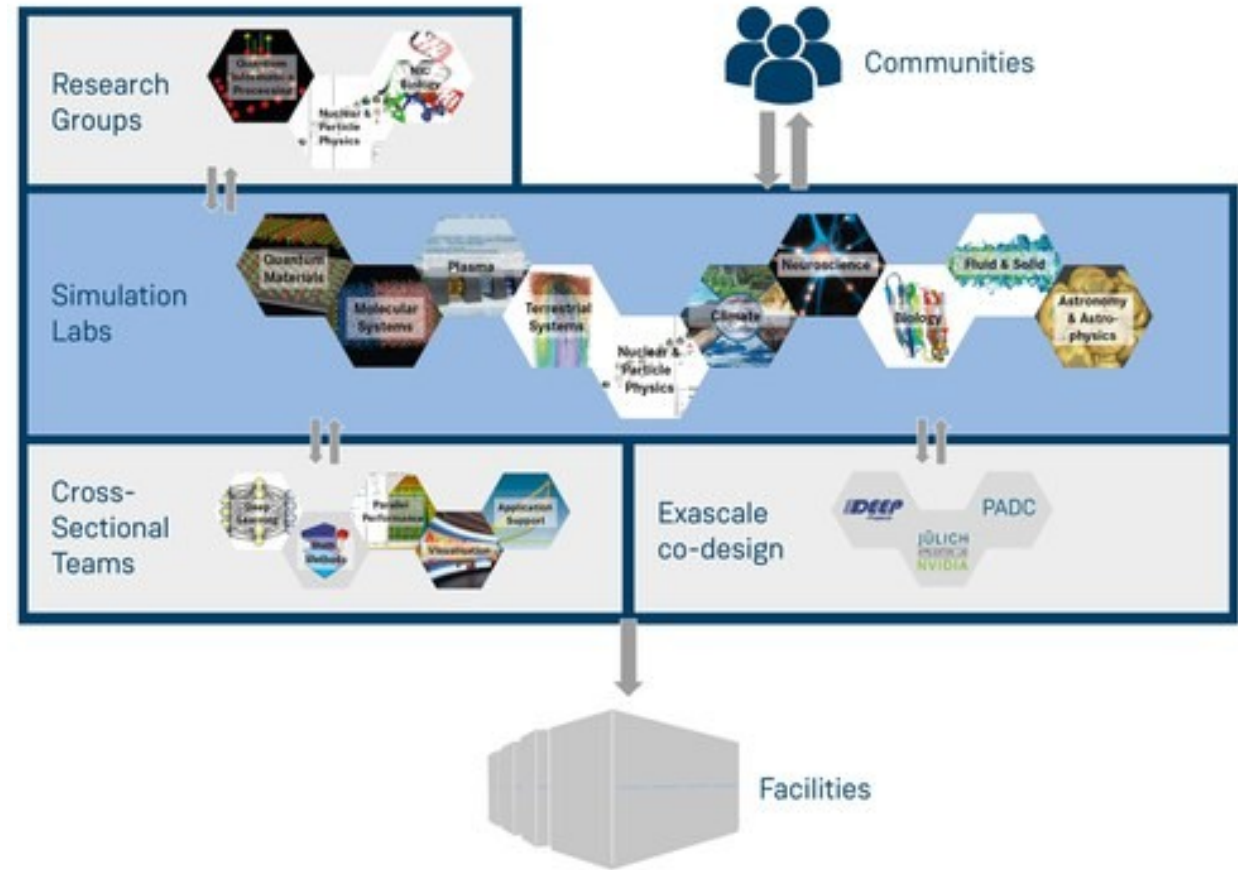
Support structure

- HPC support: sc@fz-juelich.de
- **ATMLs**
Algorithms, Tools and Methods Labs
- **SDLs**
Simulation and Data Labs
 - SDL Astronomy & Astrophysics
- **project mentor**
- **training**

fz-juelich.de/en/ias/jsc/news/events/training-courses/2025

- Helmholtz GPU Hackathon 01.-11.April 2025 (application deadline: 10.Feb 2025)

openhackathons.org/s/siteevent/a0CUP00000sOCKN2A4/se000363



Further opportunities

- support projects:
 - POP - Performance Optimisation and Productivity: pop-coe.eu
 - Epicure: epicure-hpc.eu



Meet our Support Services

[KNOW MORE](#)

 Code Enabling and Scaling Support for enabling and increase the scalability of user codes to EuroHPC supercomputers.	 Performance Analysis Performance analysis for HPC codes.
 Benchmarking Our service focuses on developing a benchmarking suite to evaluate the performance of EuroHPC machines.	 Code Refactoring This service involves restructuring or rewriting parts of an application code to improve its maintainability but without changing its function.
	 Code Optimization Our service aims at improving the efficiency and performance of the software such that it consumes fewer resources.

- for students:
 - IHP.CSS25 International HPC Summer School, 06.-11.July 2025 (application deadline 31.Jan 2025): ss25.ihpcss.org
 - GSP25 Guest student programme on Scientific Computing, 04.Aug - 10.Oct 2025 (application deadline 30.April 2025): fz-juelich.de/en/ias/jsc/education/master-students/guest-student-programme

Tool development

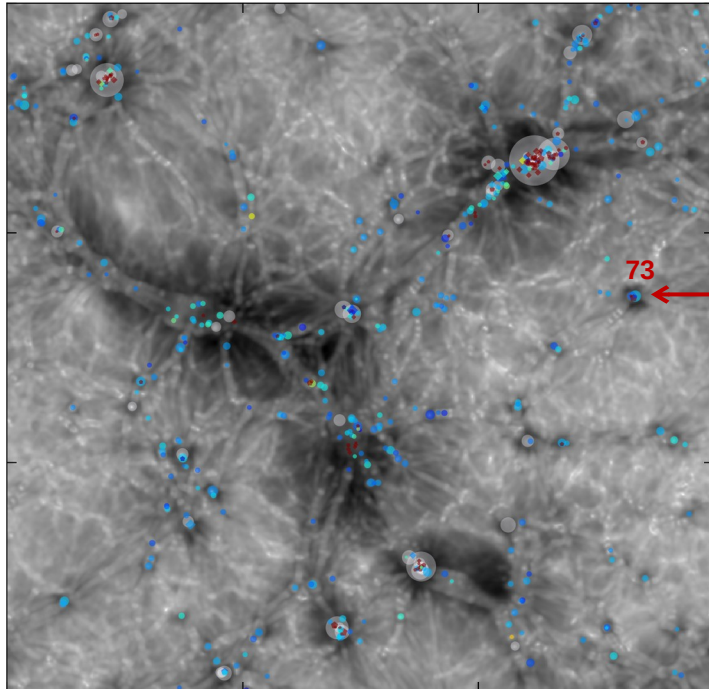
Mapping individual galaxies across cosmological simulations

Python MPI with mpi4py for distributed memory, with MPI shared memory windows

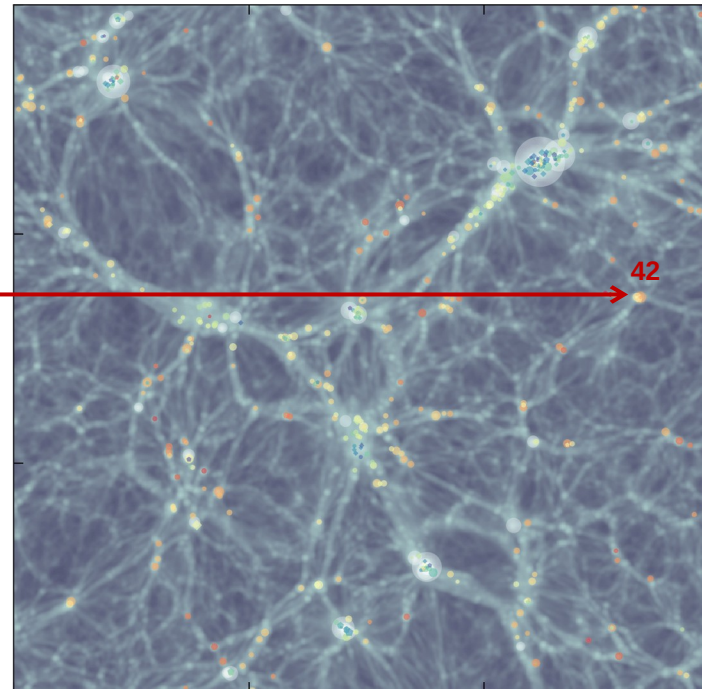


Jonas von der Heydt
email: jonas.vonderheydt@student.uni-luebeck.de

simulation 1 (TNG100-Dark)



simulation 2 (TNG100)



Astro & HPC – going forward

- What are the types of computations Virgo wants to do in the next 5 years?
- What's the state of GPU-readiness? (Catch up? Sit out? Run on private clusters?)
- What are Virgo's needs & wishes for HPC resources & infrastructure?
 - Hardware:
 - Memory bound? (Communication bound?)
 - Data analysis cluster? (MSA – Modular Supercomputing Architecture)
 - Workflows:
 - Wishes for changes in the operation of HPC centres? (campaign based computing?)
 - Tooling:
 - Which HPC / astro tools would you appreciate?
 - Support:
 - Which HPC support would you appreciate?

Anything else you would want to tell the HPC centre?

