## Services of HLRN

HLRN operates its supercomputer as a service for science in Northern Germany. We offer:

**Computing Capacity**
With the HLRN-IV computer system and its infrastructure excellent conditions exist for large projects in High Performance Scientific Computing (HPSC).

**Admission and Resource Allocation**
Projects are granted in accordance with the Scientific Board of HLRN (Wissenschaftlicher Ausschuss des HLRN). Resources are allocated the project after successful review.

**Consultancy and Support**
The North-German consulting and competence network provides support at any stage of a project. The network has experts in the fields of geosciences, chemistry, material sciences, engineering sciences, climatology, oceanology, mathematics, physics, and informatics.

**Program Libraries and Tools**
Scientists developing their own program systems have a large number of scientific libraries and development tools available. We also mediate special research codes from the Scientific Computing Division at ZIB.

**Software Packages**
We provide common application software for special areas, in particular for chemistry and engineering sciences.

## Contact

E-Mail: contact@hlrn.de

The **Administrative Council (Verwaltungsrat)** decides on all matters of fundamental relevance.
E-mail (Office): verwaltungsrat-gs@hlrn.de

**Scientific Board (Wissenschaftlicher Ausschuss)**
E-Mail: zulassung@hlrn.de

**HLRN Homepage**
www.hlrn.de

**Documentation and Support**
www.hlrn.de/home/view/Service

## HLRN Host and Operation Sites

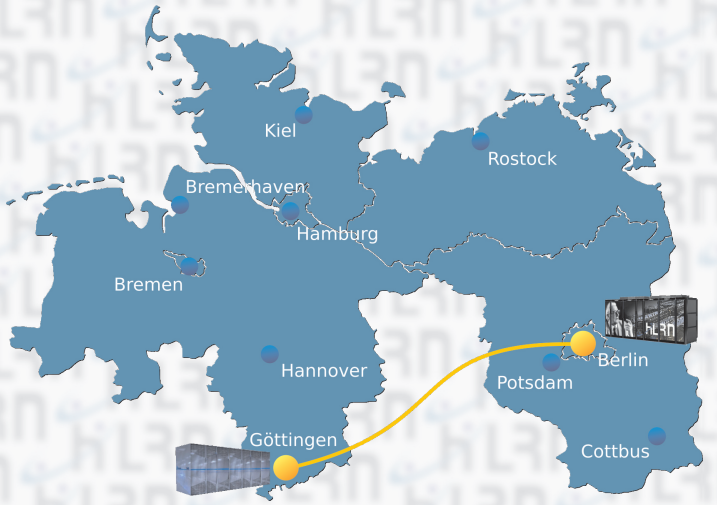
**Konrad-Zuse-Zentrum**
**für Informationstechnik Berlin (ZIB)**
Takustraße 7
14195 Berlin-Dahlem
www.zib.de

**Georg-August-Universität Göttingen**
Wilhelmsplatz 1
37073 Göttingen
www.uni-goettingen.de

GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN



# Norddeutscher Verbund für Hoch- und Höchstleistungsrechnen




GEFÖRDERT VOM
Bundesministerium für Bildung und Forschung

North-German Supercomputing Alliance (HLRN)

## About HLRN

The seven North-German states Berlin, Brandenburg, Bremen, Hamburg, Mecklenburg-Vorpommern, Niedersachsen and Schleswig-Holstein established in 2001 (Brandenburg joined in 2012) the North-German Supercomputing Alliance (Norddeutscher Verbund zur Förderung des Hoch- und Höchstleistungsrechnens – HLRN). The HLRN alliance jointly operates a distributed supercomputer system hosted at Konrad-Zuse-Zentrum für Informationstechnik Berlin (ZIB) and at Georg-August-Universität Göttingen.

For 2018 the seven states have again pooled their resources, along with funds from the federal government, to procure the HLRN-IV system. Thus a state-of-the-art tool for simulations and data analyses is once again available to scientists using the HLRN.

HLRN is used mainly by scientists from universities and other scientific institutions of the participating states. It satisfies the ever increasing huge demand for computing resources in various scientific areas. Thus current research questions in environmental research, climate and ocean modelling, engineering sciences like aerodynamics and ship building, as well as in fundamental research of physics, chemistry, material sciences, and the life sciences can be answered.

In their work users and projects benefit from the support of a transregional and interdisciplinary competence network of consultants which is spread over all participating institutions of the HLRN alliance.

## HLRN System Configuration

The HLRN-IV system consists of two almost identical complexes based on Atos/Intel supercomputers with Omni-Path interconnect: one in Göttingen, the other one in Berlin. The installations are named *Lise* (in Berlin) and *Emmy* (in Göttingen) in honour of Lise Meitner and Emmy Noether.

The total system (phase 1: 2018, phase 2: 2019) comprises more than 200,000 cores with a total peak performance of about 16 PFLOP/s.

## Operating System and Software Selection

**Operating system**
CentOS

**Compiler**
Intel, GNU

**Libraries and application software**
CP2K, Gaussian, GROMACS, NAMD, RELION, Turbomole, VMD, VASP, ABAQUS, ANSYS, CFX, FLUENT, OpenFOAM, STAR-CCM+, STAR-CD, Intel MKL, PetSc, BLAS, LAPACK, SuiteSparse, FFTW, METIS

**Parallelisation**
SHMEM, Intel MPI, OpenMP, OpenACC

**Profiling and Debugging**
Intel Parallel Studio XE, Allinea DDT, TotalView

**System software**
Slurm, Lustre, Bright ClusterManager, Intel Data Center Manager

## Final Hardware Configuration (Berlin and Göttingen)

| | |
|---|---|
| Node types | Intel Xeon Skylake/Cascade Lake AP |
| Number of nodes | > 2,000 |
| Number of compute cores | > 200,000 |
| Peak performance | ~ 16 PFLOP/s |
| Memory | > 500 TB |
| Disk space | |
| HOME | > 500 TB |
| WORK | > 16 PB |
| Communication and I/O network | 100 Gb/s Omni-Path |

HLRN