JÜLICH
FORSCHUNGSZENTRUM

Welcome and Introduction of the Jülich Supercomputing Centre

St. Meier and N. Attig
Jülich Supercomputing Centre (JSC), Forschungszentrum Jülich

Schedule: Thursday, November 25

13:00 - 13:30	Welcome and Introduction of JSC Norbert Attig, Stefanie Meier, JSC
13:30 - 15:00	JUROPA/HPC-FF - An Overview Ulrich Detert, Ulla Ehrhart, JSC
15:00 - 15:20	Break
15:20 - 16:20	JUROPA/HPC-FF - Tuning for the platform Mario Deilmann, Intel
16:20 - 16:40	Break
16:40 - 17:40	JUROPA/HPC-FF - Tuning for the platform II Peter Niessen, ParTec

Schedule: Friday, Nov 26 (morning)

09:00 - 09:05	Welcome of new participants Stefanie Meier, JSC
09:05 - 10:10	HPC Software - Compiler and Tools Bernd Mohr, JSC
10:10 - 10:30	Break
10:30 - 11:00	UNICORE - Uniform Resource Access at JSC Michael Rambadt, JSC
11:00 - 11:30	HPC Software - Math Libs & Application Software Inge Gutheil, JSC
11:30 - 12:30	Lunch break

Schedule: Friday, Nov 26 (afternoon)

12:30 - 13:30	JUGENE - An overview Michael Stephan, JSC
13:30 - 13:50	Break
13:50 - 14:50	JUGENE - Tuning for the platform Christoph Pospiech, IBM
14:50 - 15:10	Break
15:10 - 16:10	JUGENE - Tuning for the platform II Christoph Pospiech, IBM
16:10 - 16:30	Open Discussion

Organizational Information

- List of participants
- Course foils after the course available via
  - http://www.fz-juelich.de/jsc/neues/termine/supercomputer
- WLAN access
  - MAC-address needed (->List)
- Bus-Shuttle to/from Jülich (->List)
  - Thursday at 5:45pm from JSC
  - Friday at 8:30am from Hotel Hexenturm
- Lunch on Friday via “Guest Cards”
  - ->Friday,1st break, E.Bielitza

Mitglied der Helmholtz-Gemeinschaft

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Introduction of the Jülich Supercomputing Centre

N. Attig
Jülich Supercomputing Centre (JSC), Forschungszentrum Jülich

Access to Supercomputing Resources at Jülich

- Traditional access to JUGENE and JUROPA via
  - John von Neumann Institute for Computing (NIC)
    (currently allocating the JUGENE CPU time resources
    on behalf of the Gauss Centre for Supercomputing, GCS)
  - Kommission zur Vergabe von SC Ressourcen (VSR)
    (for FZJ staff members only; merged with NIC for JUGENE)
- Further access to JUGENE via
  - European research infrastructure PRACE, …
    - First regular call for proposals June 2010, projects now active
    - Second regular call for proposals now open until 11 Jan 2011
    - Preparatory access open, no closing dates
- Access to HPC-FF via
  - HPC-FF Board (Secretary: Roman Zagorsky); www.efda-hlst.eu

Gauss Centre for Supercomputing (GCS)

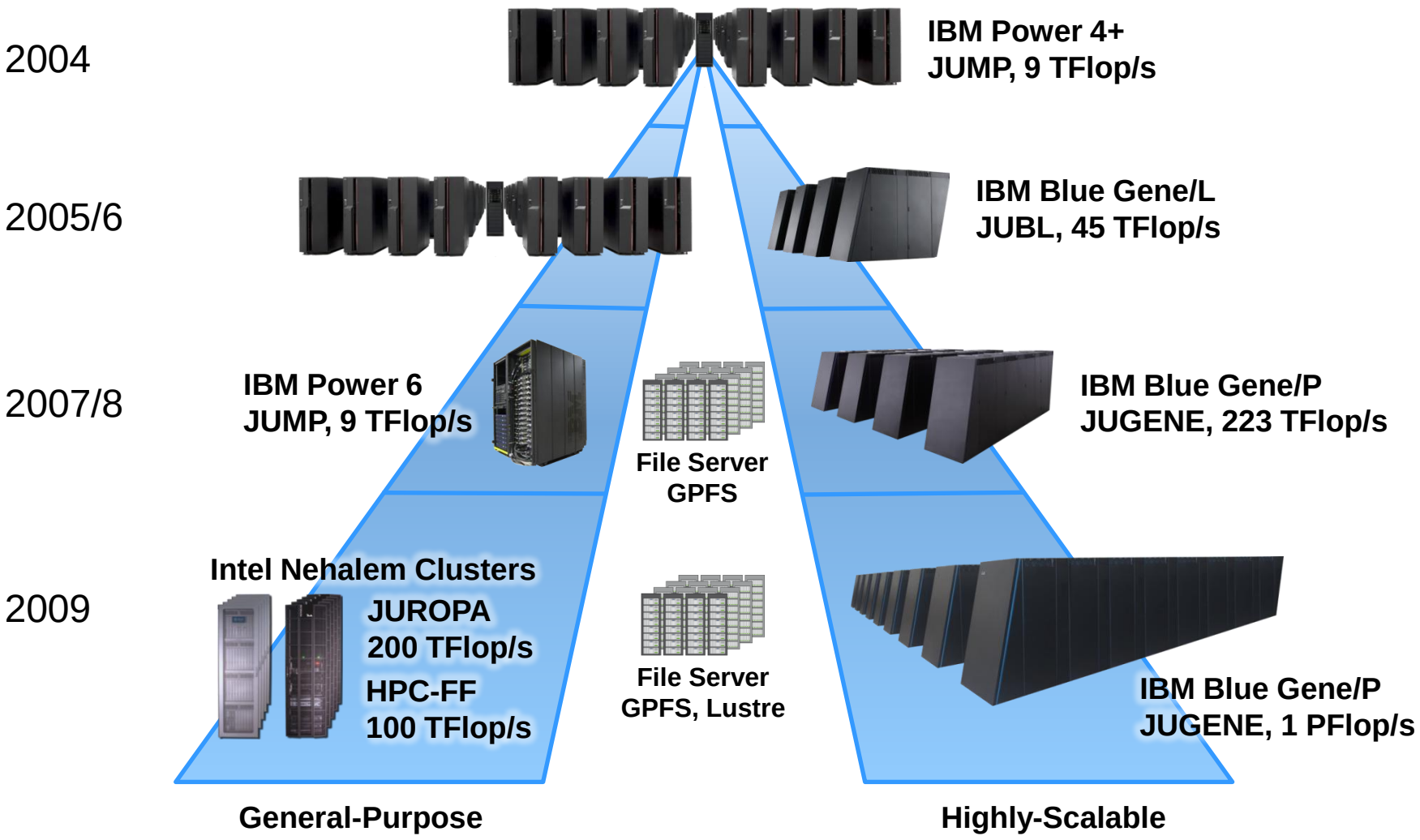
- Alliance of the three German national supercomputing centres
  - Jülich Supercomputing Centre (JSC)
  - Leibniz-Rechenzentrum (LRZ)
    der Bayerischen Akademie der Wissenschaften
  - Höchstleistungsrechenzentrum Stuttgart (HLRS)
- Support of computational science through
  - Multi-Petaflop/s supercomputers
  - Multi-Petabyte storage
  - Multi-Gigabit networking infrastructure
  - Large-Scale projects → Gauss projects → Call for Proposals
- German representative in PRACE

PRACE

Partnership for Advanced Computing in Europe

- Consists of 20 European partner states, each represented by one institution
- Prepares the creation of a persistent, sustainable pan-European HPC service
- Prepares the establishment of three to five Tier-0 supercomputing centres at different European sites
- Defines and establishes a legal and organisational structure involving HPC centres, national funding agencies, and scientific user communities
- Develops funding and usage models and establishes a peer review process
- Provides training for European scientists and creates a permanent education programme

Supercomputer Systems: Dual Concept



JUGENE: Jülich's Scalable Petaflop System

IBM Blue Gene/P JUGENE

- 32-bit PowerPC 450, 850 MHz, 4-way SMP
- 72 racks, 294,912 procs
- 1,00 Petaflop/s peak
  0,82 Petaflop/s Linpack
- 144 TByte main memory
- connected to a Global Parallel File System (GPFS) with 5 PByte online disk and up to 25 PByte offline tape capacity
- Torus network
- Production start: July 1, 2009

First Petaflop system in Europe, no 9 in Top500 (Nov 2010)

JUROPA: Jülich's General-Purpose Supercomputer

JUROPA, an Intel-based cluster

- 2 Intel Nehalem quad-core processors, 2.93 GHz, SMT
- 2,208 compute nodes, 17,664 cores
- 207 Teraflop/s peak
  184 Teraflop/s Linpack
- 52 TByte memory
- Mellanox Infiniband QDR with non-blocking Fat Tree topology
- 500 TByte disk storage on Lustre file system, connected to GPFS

JUROPA designed in co-development with HPC companies

JUROPA serves as prototype for
HPC-FF, U. of Cambridge, CHPC (Cape Town), PRACE

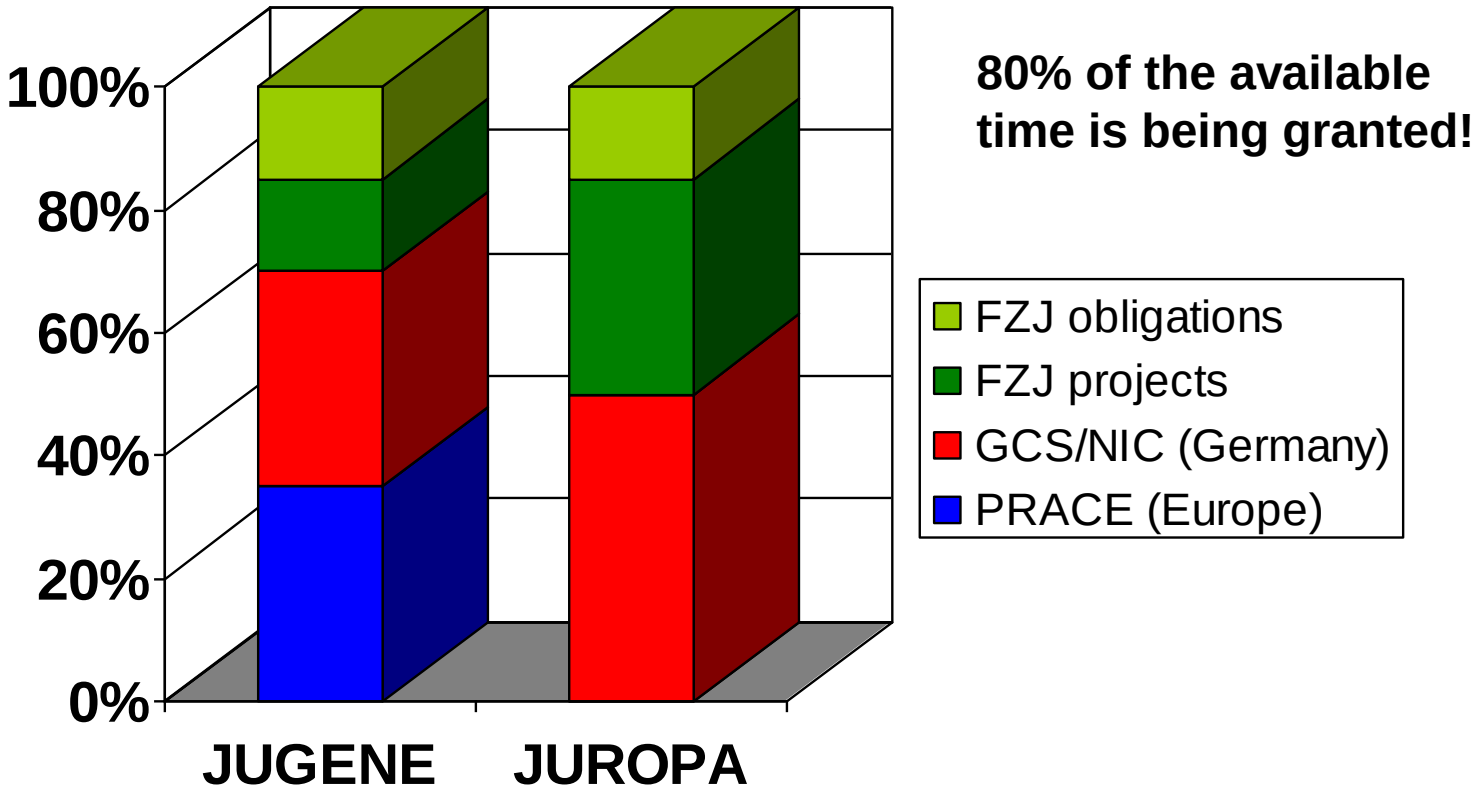
HPC-FF
High-Performance Computer for Fusion

- Intel-based Linux cluster
  identical in construction with JUROPA
- 1,080 compute nodes
- 101 Teraflop/s peak
  87 Teraflop/s Linpack
- funded by EU, EFDA and FZJ
- dedicated to European
  fusion community

HPC-FF and JUROPA can be
used as a single system

308 Teraflop/s peak
275 Teraflop/s Linpack, no. 23 in Top500 (Nov 2010)

Use by Compute Time Shares

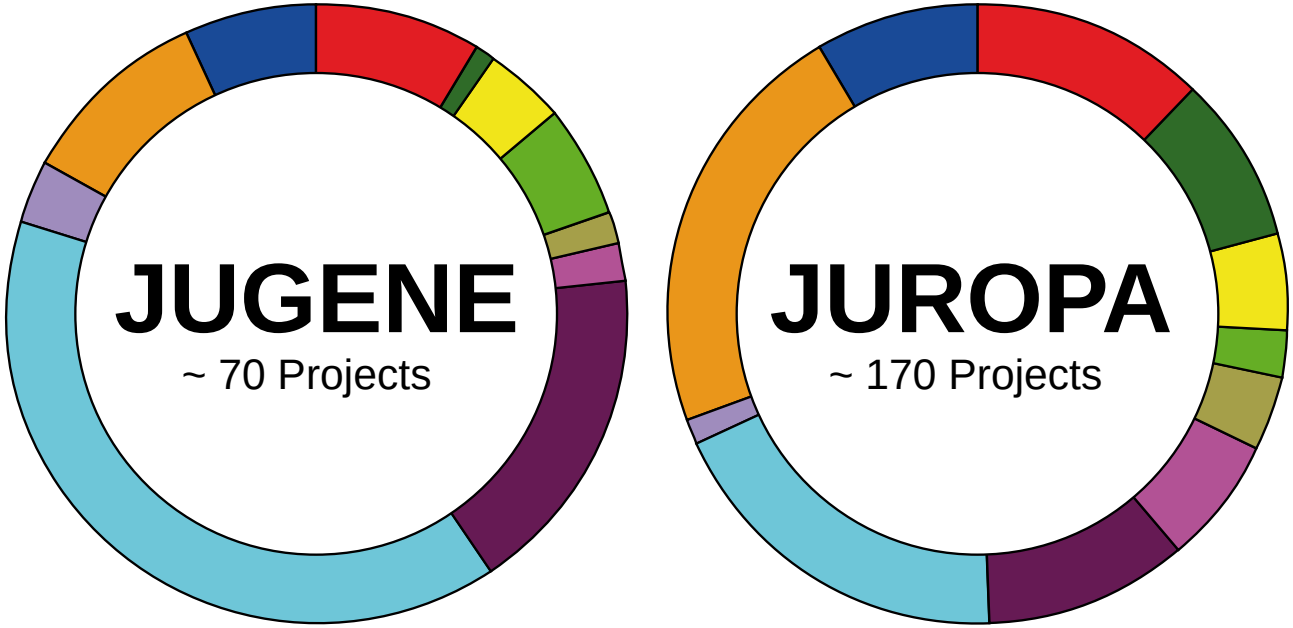


80% of the available time is being granted!

Research Fields of Current National Projects

Leadership-Class System

General-Purpose Supercomputer

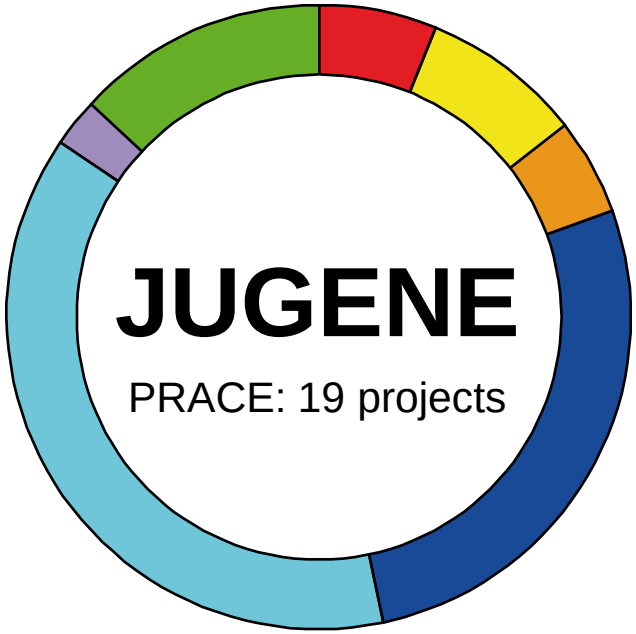


Granting periods
05/2010 – 04/2011
11/2010 – 10/2011

High oversub-scription factor

- Astrophysics
- Biophysics
- Chemistry
- Earth & Environment
- Plasma Physics
- Soft Matter
- Fluid Dynamics
- Elementary Particle Physics
- Computer Science
- Condensed Matter
- Material Science

Research Fields of Current European Projects

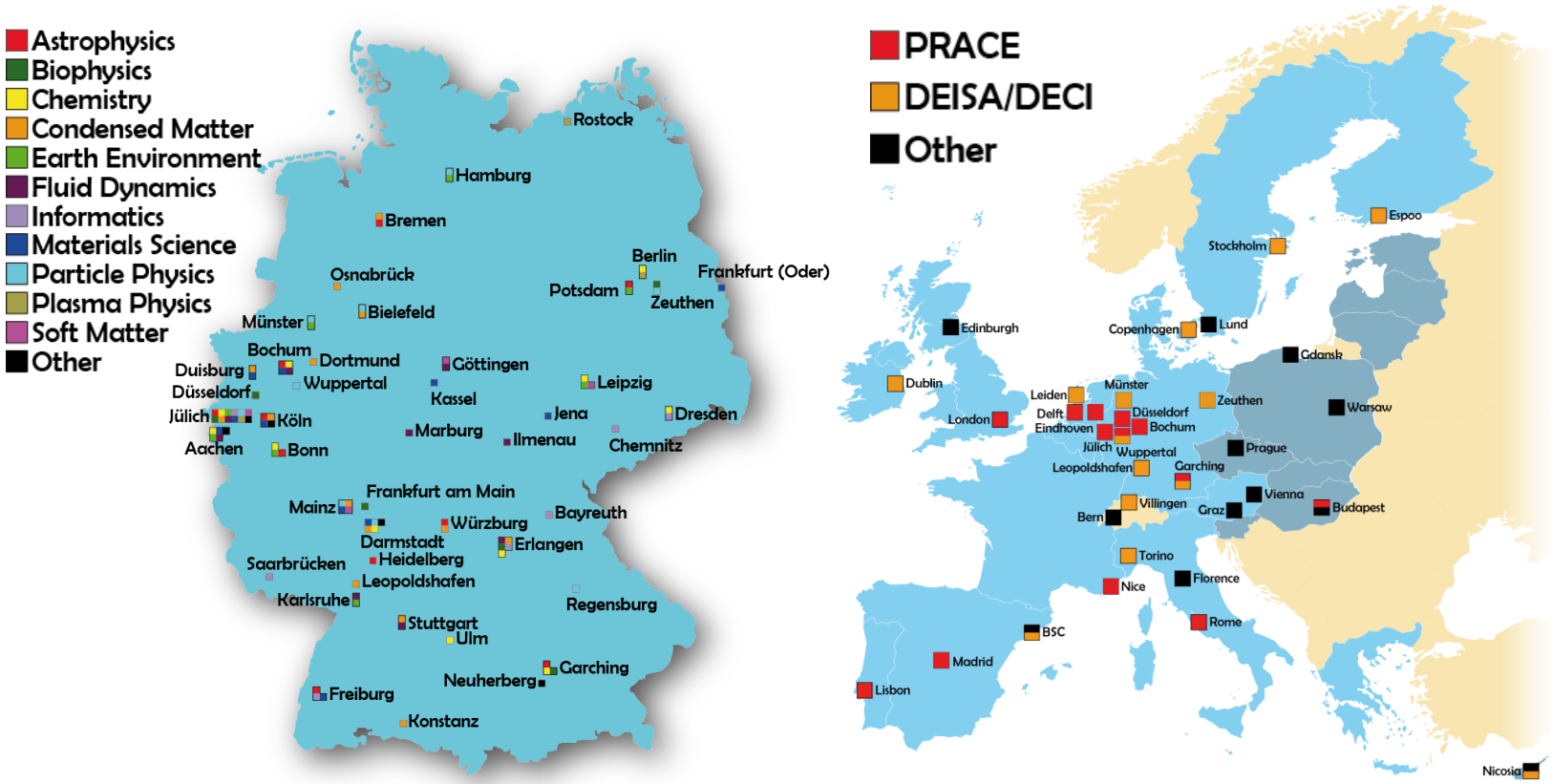


- Astrophysics
- Chemistry and Materials
- Earth Sciences and Environment
- Engineering and Energy
- Fundamental Physics
- Mathematics and Computer Science
- Medicine and Life Sciences

High oversubscription factor!

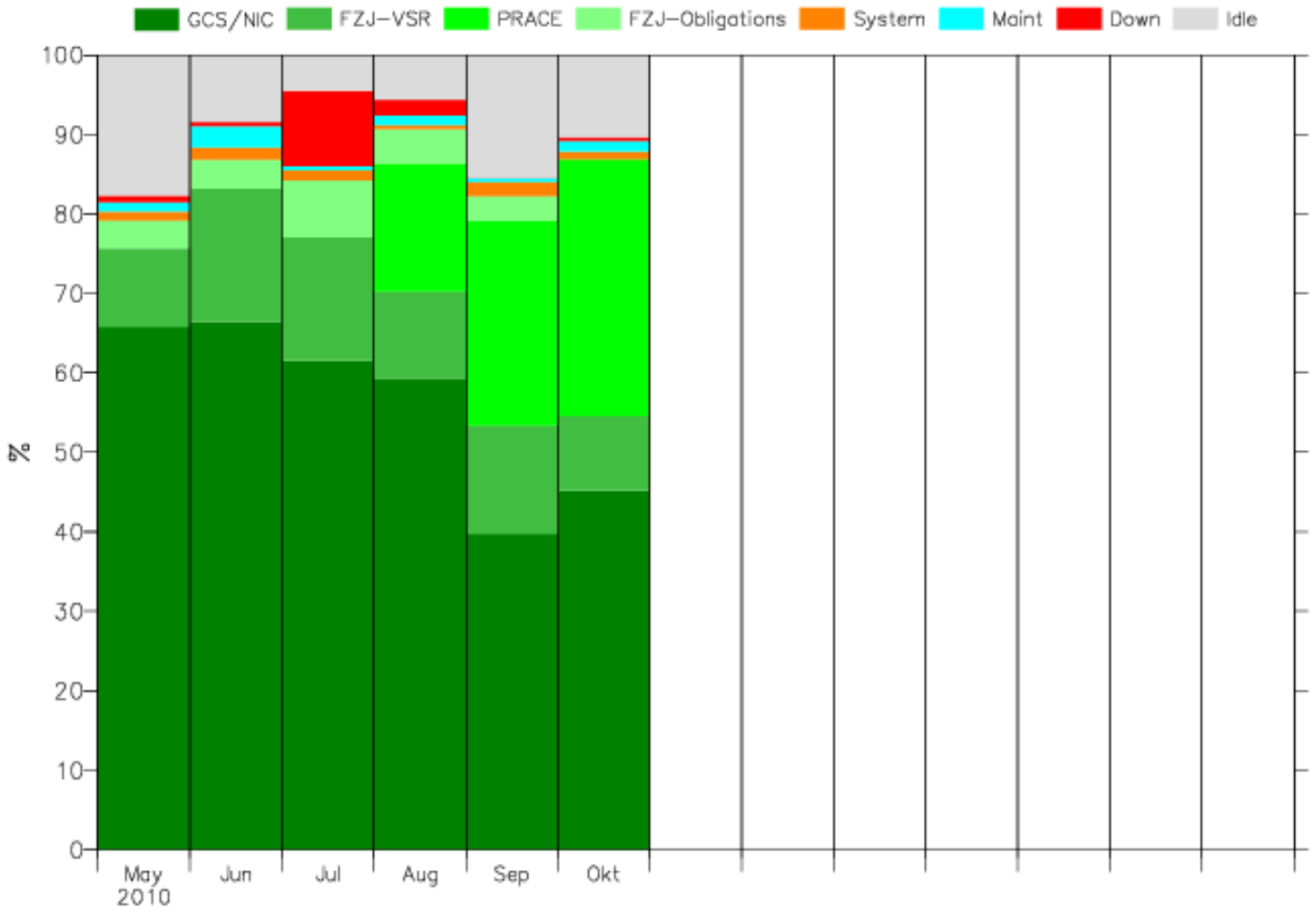
Granting periods
08/2010 – 04/2011 Early Access Call
11/2011 – 10/2011 1st Regular Call

National and European User Groups

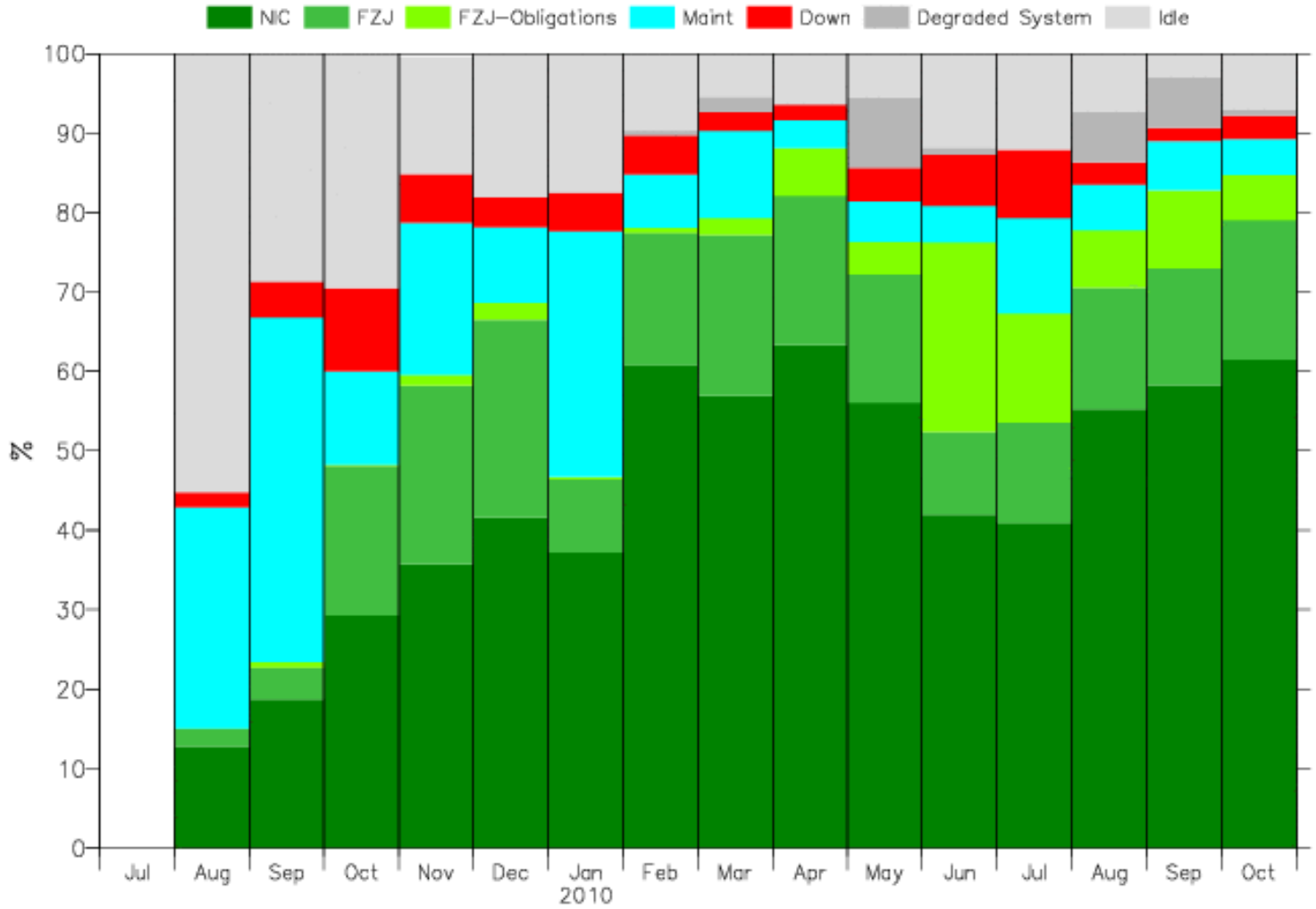


- Proposals for computer time accepted from Germany and Europe
- Peer review by international referees
- CPU time is granted by independent Scientific Councils

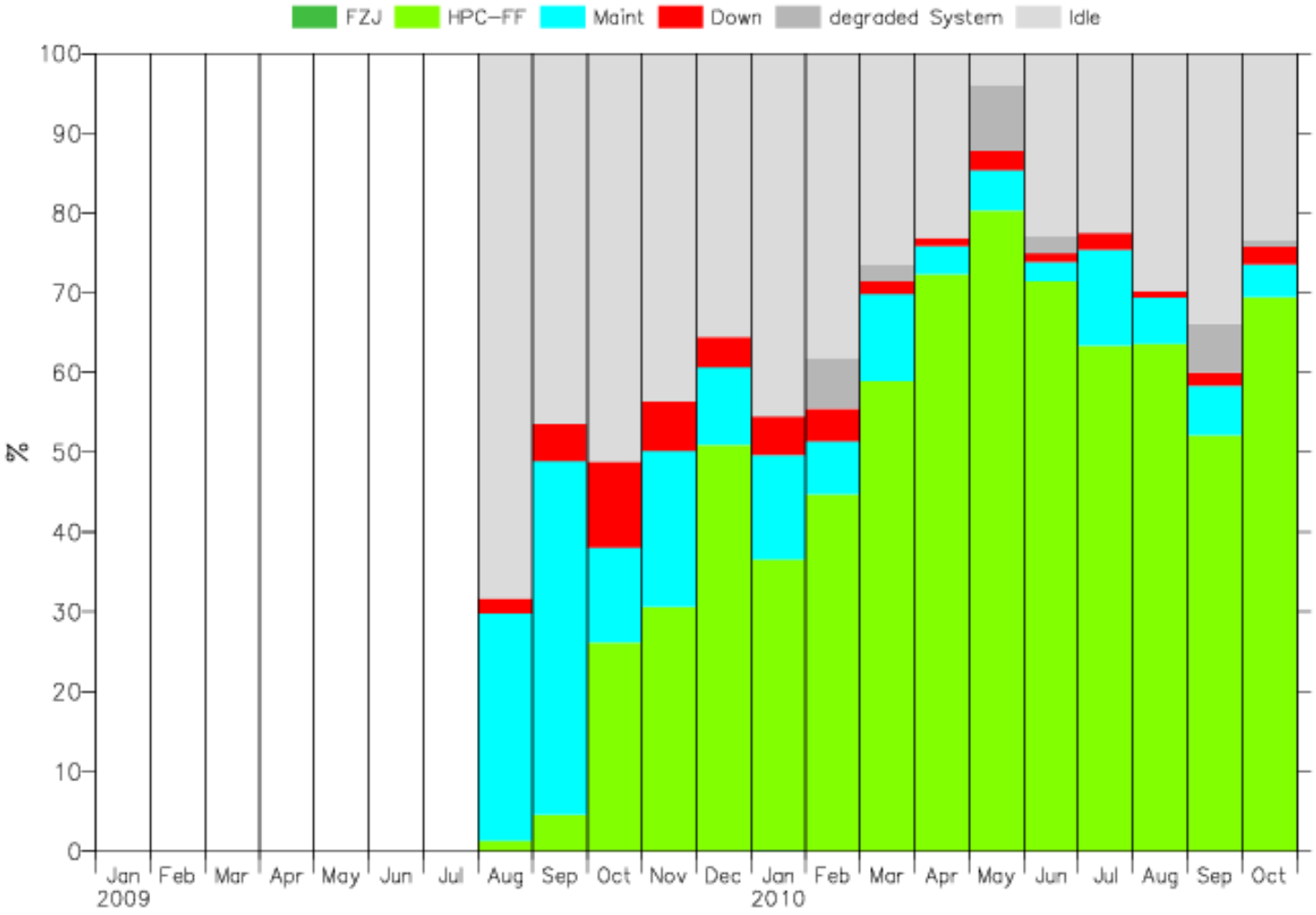
JUGENE Usage



JUROPA Usage



HPC-FF Usage


FZJ
HPC-FF
Maint
Down
degraded System
Idle
%
100
90
80
70
60
50
40
30
20
10
0
Jan 2009
Feb
Mar
Apr
May
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Sep
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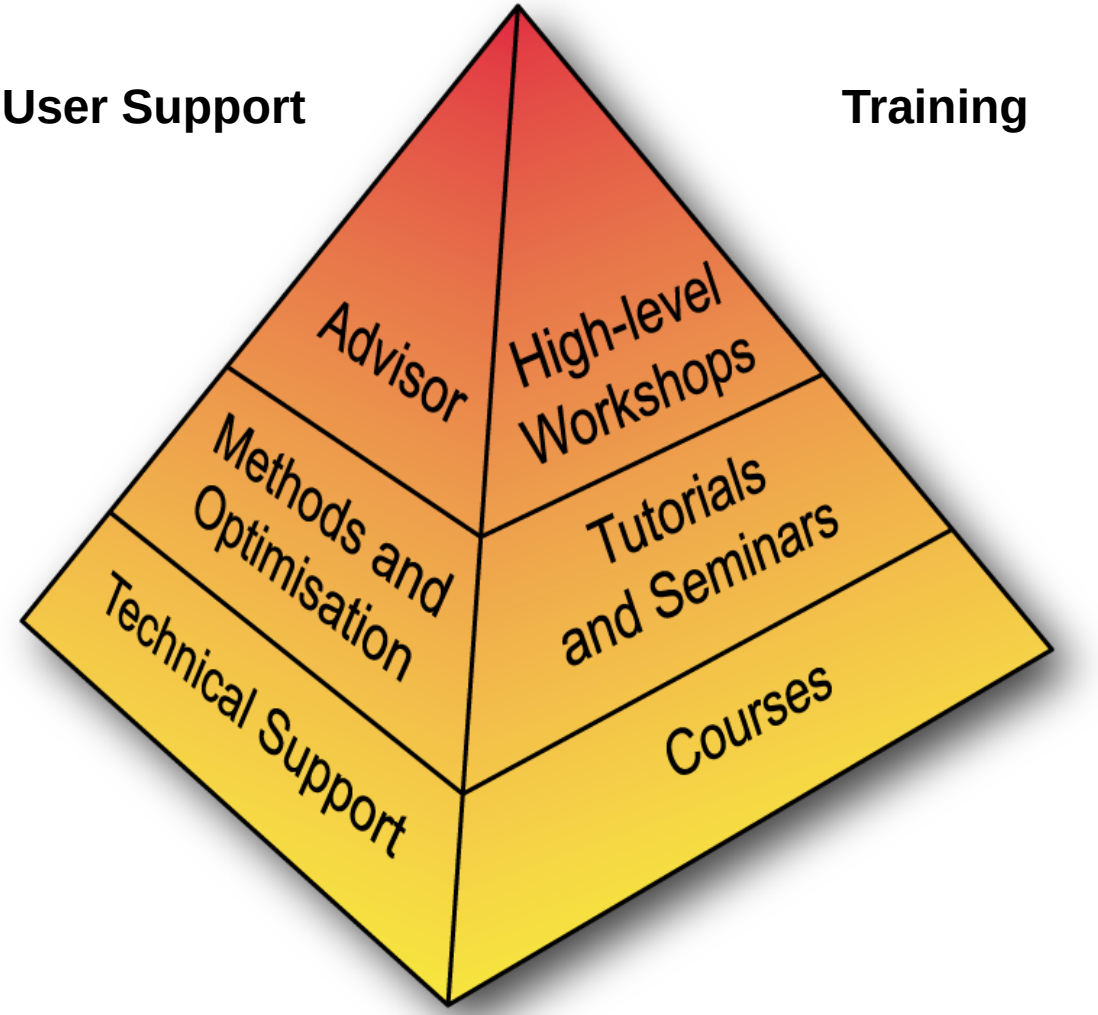
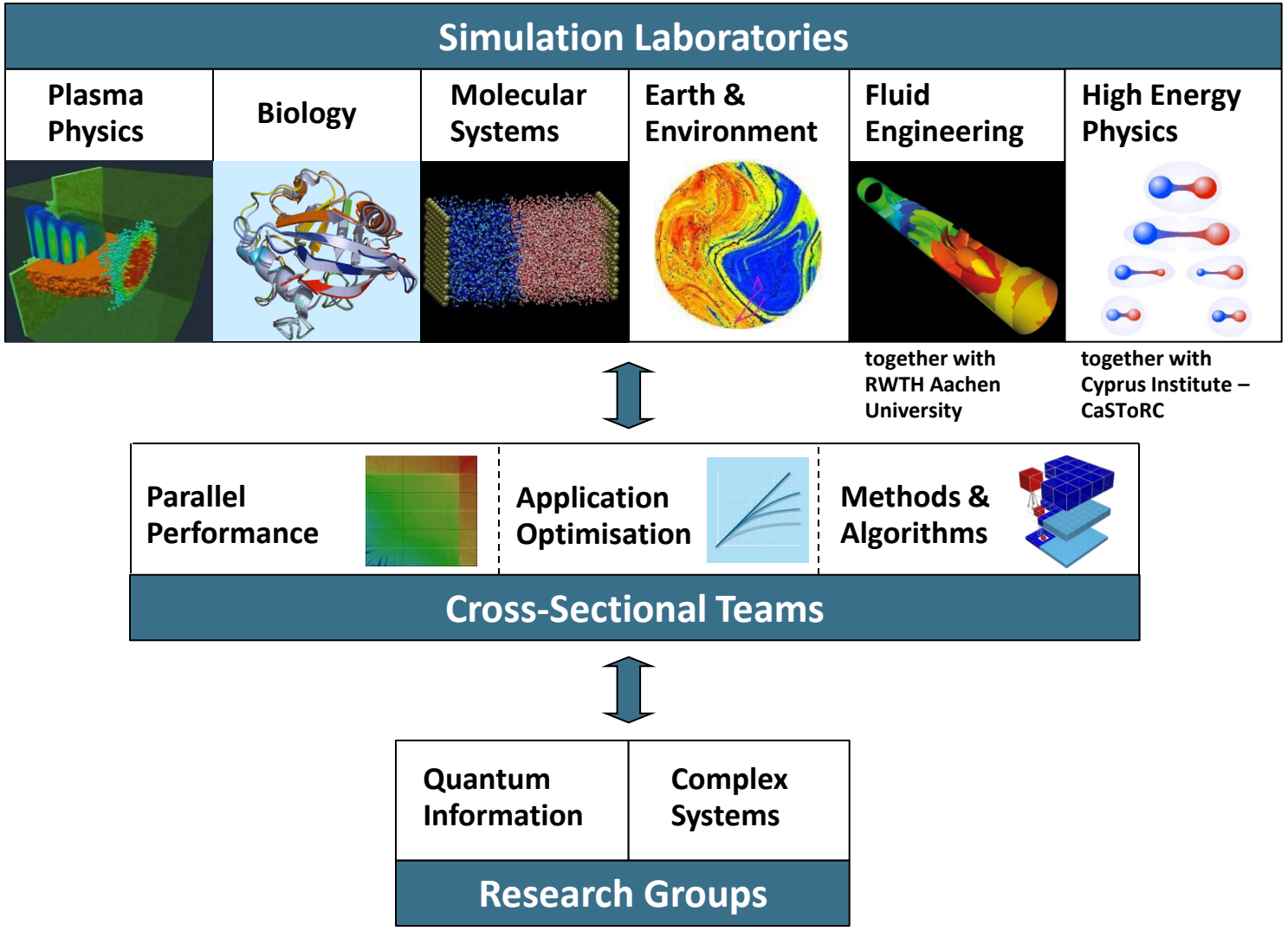
Oct

Traditional Support Structure



Domain-Specific User Support and Research



Summary

- The Jülich Supercomputing Centre provides
  - world-class supercomputers
  - high-end primary and domain-specific user support
  - …

  to German and European research groups working in the computational sciences and in engineering

- JSC expects to see
  - breakthrough science
  - parallel applications, using a substantial number of processors simultaneously

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End of Presentation