



**CSCS**

Centro Svizzero di Calcolo Scientifico  
Swiss National Supercomputing Centre

# The Swiss National Supercomputing Centre

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CSCS-USI Summer School 2014

Serpiano, Switzerland



Eidgenössische Technische Hochschule Zürich  
Swiss Federal Institute of Technology Zurich

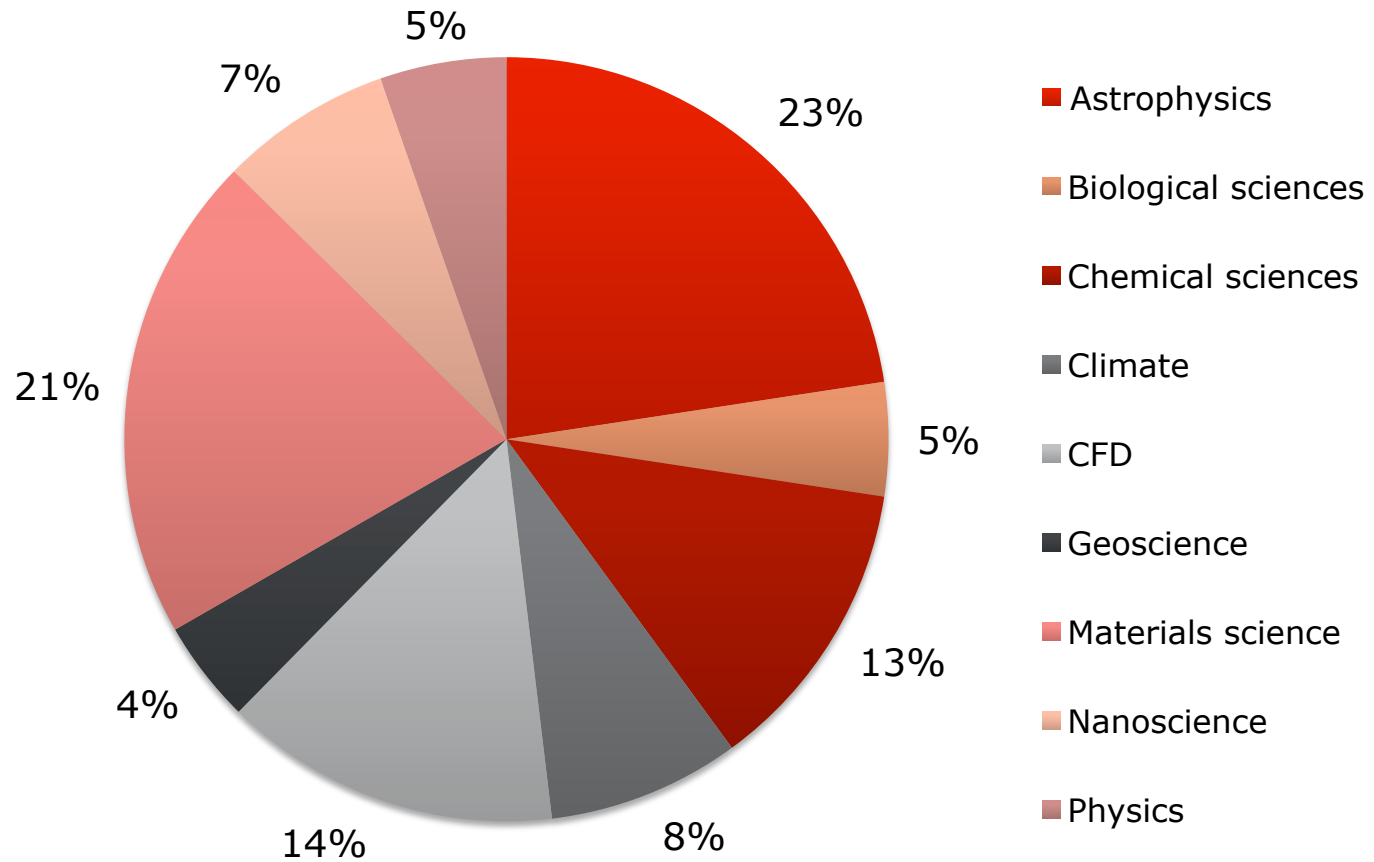
## The users of CSCS

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- **Scientific users can access CSCS computing resources for free**
  - They have to submit project requests that are assessed by international experts
  - 450 million computing hours have been allocated in 2013
  - 80 projects, over a 1000 users
- **CSCS operates third party systems for paying customers**
  - MeteoSwiss to compute the numerical weather forecasts
  - The physicists of the Swiss universities to analyse the data from the LHC experiment at CERN

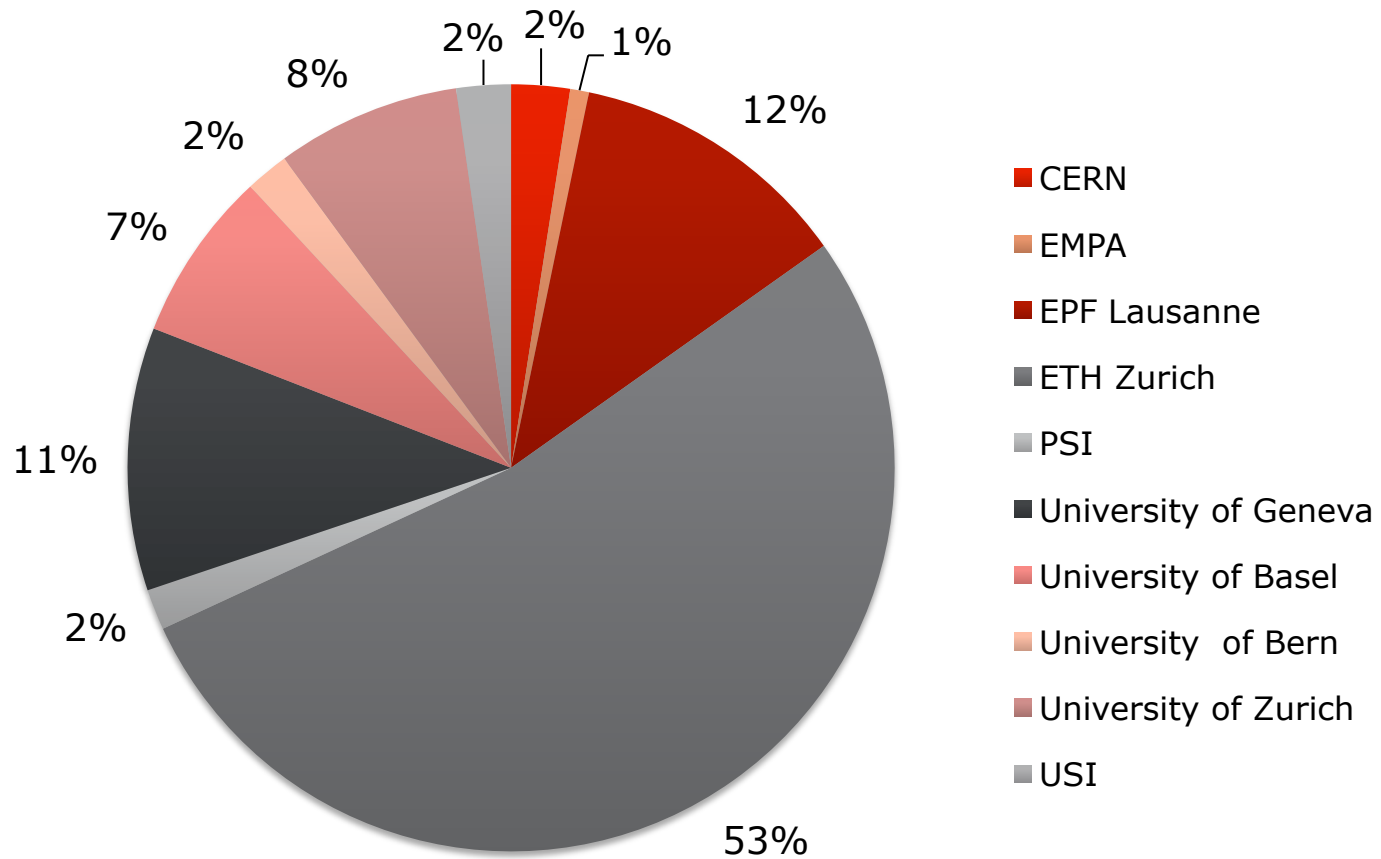
## Users by scientific field

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## Users by organisation

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## A diverse pool of supercomputers

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System	Supplier / Model	Installation / Upgrade	User	Peak Performance (Tflops)
Piz Daint	Cray XC30	2013	National User Lab	7'787
Monte Rosa	Cray XE6	2009/2011	National User Lab	402
Tödi	Cray XK7	2011/2012	R&D	393
Castor/Pollux	IBM iDataPlex	2011	R&D	47
Albis/Lema	Cray XE6	2012	Meteo Swiss	50
Dome	Dalco Cluster	2012	R&D	42
Phoenix	Dalco Cluster	2010/11/12	CHIPP (LHC Grid)	22
Pilatus	Dalco Cluster	2012	National User Lab	15
Rothorn	SGI UV 1000	2011	National User Lab	3
Matterhorn	Cray Urika	2011	National User Lab	NA

## Piz Daint

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- **Hybrid** Cray XC30 – First Cray Supercomputer with Intel Xeon + NVIDIA TESLA K20X GPU
- Upgrade with hybrid nodes completed December 2013
- **5'272** nodes, each with Intel Xeon E5-2670 (8c) + 1 GPU
- **42'176** cores (84'352 in hyperthread) – **7,79 Pflops Peak**
- 2.5 PB TB scratch – based on Lustre parallel file system



# Top 500 List November 2013

Rank	Site	System	Cores	Rmax (TFlop/s)	Rpeak (TFlop/s)	Power (kW)
1	National Super Computer Center in Guangzhou China	<b>Tianhe-2 (MilkyWay-2)</b> - TH-IVB-FEP Cluster, Intel Xeon E5-2692 12C 2.200GHz, TH Express-2, Intel Xeon Phi 31S1P NUDT	3,120,000	33,862.7	54,902.4	17,808
2	DOE/SC/Oak Ridge National Laboratory United States	<b>Titan</b> - Cray XK7 , Opteron 6274 16C 2.200GHz, Cray Gemini interconnect, NVIDIA K20x Cray Inc.	560,640	17,590.0	27,112.5	8,209
3	DOE/NNSA/LLNL United States	<b>Sequoia</b> - BlueGene/Q, Power BQC 16C 1.60 GHz, Custom IBM	1,572,864	17,173.2	20,132.7	7,890
4	RIKEN Advanced Institute for Computational Science (AICS) Japan	<b>K computer</b> , SPARC64 Villifx 2.0GHz, Tofu interconnect Fujitsu	705,024	10,510.0	11,280.4	12,660
5	DOE/SC/Argonne National Laboratory United States	<b>Mira</b> - BlueGene/Q, Power BQC 16C 1.60GHz, Custom IBM	786,432	8,586.6	10,066.3	3,945
6	Swiss National Supercomputing Centre (CSCS) Switzerland	<b>Piz Daint</b> - Cray XC30, Xeon E5-2670 8C 2.600GHz, Aries interconnect , NVIDIA K20x Cray Inc.	115,984	6,271.0	7,788.9	2,325
7	Texas Advanced Computing Center/Univ. of Texas United States	<b>Stampede</b> - PowerEdge C8220, Xeon E5-2680 8C 2.700GHz, Infiniband FDR, Intel Xeon Phi SE10P Dell	462,462	5,168.1	8,520.1	4,510
8	Forschungszentrum Juelich (FZJ) Germany	<b>JUQUEEN</b> - BlueGene/Q, Power BQC 16C 1.600GHz, Custom Interconnect IBM	458,752	5,008.9	5,872.0	2,301
9	DOE/NNSA/LLNL United States	<b>Vulcan</b> - BlueGene/Q, Power BQC 16C 1.600GHz, Custom Interconnect IBM	393,216	4,293.3	5,033.2	1,972
10	Leibniz Rechenzentrum Germany	<b>SuperMUC</b> - iDataPlex DX360M4, Xeon E5-2680 8C 2.70GHz, Infiniband FDR IBM	147,456	2,897.0	3,185.1	3,423



## Green 500 November 2013

Green500 Rank	MFLOPS/W	Site*	Computer*	Total Power (kW)
1	4,503.17	GSIC Center, Tokyo Institute of Technology	TSUBAME-KFC - LX 1U-4GPU/104Re-1G Cluster, Intel Xeon E5-2620v2 6C 2.100GHz, Infiniband FDR, NVIDIA K20x	27.78
2	3,631.86	Cambridge University	Wilkes - Dell T620 Cluster, Intel Xeon E5-2630v2 6C 2.600GHz, Infiniband FDR, NVIDIA K20	52.62
3	3,517.84	Center for Computational Sciences, University of Tsukuba	HA-PACS TCA - Cray 3623G4-SM Cluster, Intel Xeon E5-2680v2 10C 2.800GHz, Infiniband QDR, NVIDIA K20x	78.77
4	3,185.91	Swiss National Supercomputing Centre (CSCS)	Piz Daint - Cray XC30, Xeon E5-2670 8C 2.600GHz, Aries interconnect, NVIDIA K20x Level 3 measurement data available	1,753.66
5	3,130.95	ROMEO HPC Center - Champagne-Ardenne	romeo - Bull R421-E3 Cluster, Intel Xeon E5-2650v2 8C 2.600GHz, Infiniband FDR, NVIDIA K20x	81.41
6	3,068.71	GSIC Center, Tokyo Institute of Technology	TSUBAME 2.5 - Cluster Platform SL390s G7, Xeon X5670 6C 2.930GHz, Infiniband QDR, NVIDIA K20x	922.54
7	2,702.16	University of Arizona	iDataPlex DX360M4, Intel Xeon E5-2650v2 8C 2.600GHz, Infiniband FDR14, NVIDIA K20x	53.62
8	2,629.10	Max-Planck-Gesellschaft MPI/IPP	iDataPlex DX360M4, Intel Xeon E5-2680v2 10C 2.800GHz, Infiniband, NVIDIA K20x	269.94
9	2,629.10	Financial Institution	iDataPlex DX360M4, Intel Xeon E5-2680v2 10C 2.800GHz, Infiniband, NVIDIA K20x	55.62
10	2,358.69	CSIRO	CSIRO GPU Cluster - Nitro G16 3GPU, Xeon E5-2650 8C 2.000GHz, Infiniband FDR, Nvidia K20m	71.01



# Greenest Petaflop supercomputer!

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# Thanks for your attention.