# ETH zürich

# Annual report 2014





## At a glance

ETH Zurich is one of the leading international universities for technology and the natural sciences. It is well known for its excellent education, ground-breaking fundamental research and for implementing its results directly into practice. To researchers, it offers an inspiring working environment, to students, a comprehensive education.

Founded in 1855, ETH Zurich today has more than 18,500 students from over 110 countries, including 4,000 doctoral students. About 500 professors currently teach and conduct research in engineering, architecture, mathematics, natural sciences, system-oriented sciences as well as management and social sciences. ETH Zurich regularly appears at the top of international rankings as one of the best universities in the world. Twenty-one Nobel Laureates have studied, taught or conducted research at ETH Zurich, underlining the excellent reputation of the university.

Transferring its knowledge to the private sector and society at large is one of ETH Zurich's primary concerns. The 80 new patent applications filed each year and the 300 spin-off companies that emerged from the institute between 1996 and 2014 are evidence of ETH Zurich's success in this area. ETH Zurich helps to find long-term solutions to global challenges. The focal points of its research include energy supply, risk management, developing the cities of the future, global food security and h<u>uman health</u>.

### Statistics 2014

Students (headcount)	18,616
of which Bachelor's students	8,502
of which Master's students	5,159
of which doctoral students	3,975
Professors (headcount*)	498
Professors (full-time equivalents)	467
Personnel (full-time equivalents)	8,143
of which scientific staff	5,065
Expenditure (CHF million)	1,556
of which federal financial contribution	1,210
of which third-party funding	346

\* Includes externally employed dual professors.

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# Stability entails change

Universities are forward-thinking places: they influence the future not only through ground-breaking research projects, but also by providing excellent education and teaching. The students of today will shape the reality of tomorrow. Politicians and managers around the world are well aware of the impact that the graduates of leading universities have on the future of a company, the creation of new businesses and jobs, and the success of society as a whole. Accordingly, international competition is becoming less about land and natural resources and more about talented inventors and entrepreneurs whose activities enhance a country's power to innovate.

Innovation and investment in new technologies pay off over the long term. Rising stars need a stable environment to develop their talent and realise their potential, for instance by founding their own companies. Switzerland embodies just this sort of stability, so it comes as no surprise that our country attracts talented people from all around the world – people from other cultures whose success makes a significant contribution to an innovative Switzerland, while at the same time changing the way we live. We are, therefore, faced with the paradox that stability is necessary for innovation, but - by its very nature innovation entails change. So far, Switzerland has managed this balancing act very successfully. We must make sure that it will continue to do so in the future, as fear of change and the desire to isolate ourselves would lead us down the wrong path.

Achieving the right mix of stability and change is an essential task for a university, too. ETH has undergone dynamic development in recent years, which was possible due to its stable framework conditions, sound support from the Swiss Confederation, and good governance. However, the key factor in that success was ETH's creative and dedicated students, faculty, and staff. At the same



time, new people have continually contributed fresh ideas and carried out innovative projects. The ETH Zurich Foundation has also provided assistance enabling ETH to implement key strategic projects more quickly.

At the turn of the year, change also happened in the Executive Board of ETH: Sarah Marcella Springman took up the post of rector, Detlef Günther became vice president for research and corporate relations, and I began my presidency. Roman Boutellier, vice president for human resources and infrastructure, and Robert Perich, vice president for finance and controlling, continue to serve on the Executive Board. I would like to thank my predecessor Ralph Eichler and Roland Siegwart, vice president for research and corporate relations until the end of 2014, along with the whole former Executive Board team for all that they have accomplished over the years. They have positioned ETH exceptionally well and prepared it for the future. The new team will dedicate itself to writing the next chapter of this success story. I would also like to thank ETH Zurich's students, faculty, staff, friends and donors for their untiring commitment and valuable contributions. We will need your continued support in the years ahead in order for ETH to carry out its vital role as a centre for education, research and technology transfer working in service of Swiss society.

Lino Guzzella President of ETH Zurich since 1 January 2015



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### 1

Handing over the baton: After seven successful years, outgoing ETH President Ralph Eichler (far left) handed over his post to Lino Guzzella (second from left). Guzzella, in turn, handed over his post as rector to Sarah Springman, while Detlef Günther (centre) took over from Roland Siegwart (second from right) as vice president for research and corporate relations.

### 2

A lightning start: Students from ETH Zurich and Lucerne University of Applied Sciences and Arts built the "grimsel" electric racing car. By accelerating from 0 to 100 km/h in 1.785 seconds and in under 30 metres, it broke the previous world record for acceleration in electric cars.

### 3

Focus project wins award: The underwater robot Sepios developed by Bachelor's students from the Department of Mechanical Engineering also made a splash internationally, with the Sepios team winning the National Engineering Impact Award in the US.

### 4

**SED celebrates its centenary:** The Swiss Seismological Service (SED) has been recording earthquake signals for 100 years. In its centenary year, the Seismological Service offered insights into its past, present and future activities.

### 5

**Biological circuits:** A team from the Department of Biosystems Science and Engineering has developed several new components for biological circuits. These components are key building blocks for constructing programmable biocomputers that function precisely.

### 6

**Lokaltermin at ETH Zurich:** At his final Lokaltermin event, ETH President Ralph Eichler and five other ETH experts showed representatives from the worlds of business, politics and science the scientific and commercial value of quantum physics.













### 1

The poetry of technology: ETH Zurich and the ETH spin-off Verity Studios worked with Cirque du Soleil on a project uniting modern technology with entertainment and poetry. The joint film project featuring flying robots from ETH attracted a great deal of public attention.

### 2

**Presidential visit:** An experiment in which a scale model of Zurich's main train station is flooded stood at the centre of a visit by Singapore's President Tony Tan at ETH Zurich. Tan helped ETH Zurich to set up the Singapore-ETH Centre for Global Environmental Sustainability.

### 3

**Controlling genes with your thoughts:** ETH researchers in the Department of Biosystems have developed the first gene network to be operated via brainwaves. Depending on the user's thoughts, it can produce various amounts of a desired molecule.

### 4

**Citius – a recipe for success:** Switzerland's silver medal in the two-man bob at the Olympics in Sotschi was partly thanks to scientists at ETH Zurich. Researchers in the Department of Materials worked on developing and optimising the Citius bob.

### 5

**Closer cooperation:** Lino Guzzella in his role as ETH rector (left) and representatives of the Energy Science Center were able to further expand the university's strong ties with the Massachusetts Institute of Technology (MIT). The ETH delegation signed a student exchange agreement in the US and developed ideas for joint energy research projects.

### 6

**75 years of the ASVZ:** The Academic Sports Association Zurich (ASVZ) celebrated its 75th anniversary in 2014. University sport has enjoyed much success in Zurich, not least thanks to the close cooperation between ETH and the University of Zurich, a relationship with a long and proud history.

# A further boost to teaching

With a new degree programme, innovative courses, the Critical Thinking initiative and an expansion of the scholarship offering, ETH Zurich once again took a broad variety of measures to strengthen teaching in 2014.

In the Autumn Semester, the Department of Architecture launched a new Master's degree programme in Integrated Building Systems, which focuses on all topics within the field of building systems. A flexible auditorium in the main building and various online courses support the use of modern teaching methods, allowing more time for discussion and more in-depth study of the subject matter. In addition, interested members of the public from outside the university can now benefit from a number of online courses offered by ETH Zurich.

The university also launched a pioneering project known as the Critical Thinking initiative, which aims to provide ETH graduates with sufficient preparation for the complex issues they will encounter in their professional lives and in society. The programme will make more extensive use of the methods ETH already has available in this area, firmly establishing critical thinking as a key part of everyday life at the university.

Improvements were also made to the scholarship offering. To make the needs-based scholarship system more effective, ETH Zurich revised its scholarship regulations, making it possible to award needs-based scholarships more generously in the future. ETH Zurich also expanded the range of excellence scholarships in 2014. In addition to the Excellence Scholarship & Opportunity Programme (ESOP), which is open to applications from the best Master's students, the university now awards Master Scholarships to talented students as well.



**ESOP RECIPIENTS' NEXT STEPS** Following their Master's degrees, as of 31.12.2014



ANDREA IRNIGER is studying environmental engineering and has been awarded an Excellence Scholarship for the duration of her Master's degree. In her Master's thesis, Irniger is investigating the discharge capacity and bed load of the Sihl culverts under Zurich main station using numerical models and a hydraulic model test of the affected area on a scale of 1.30.

### Educational development

### The core educational values at ETH Zurich

The need to continually improve and regularly review its educational offering is a key issue for a world-class university. For this reason, ETH Zurich again took various steps in 2014 to further reinforce teaching in a range of areas.

### Interdisciplinary skills

One such improvement is the addition of an attractive course in the field of building systems to the range of study programmes on offer. The new Master's degree programme in Integrated Building Systems was run for the first time in the Autumn Semester. The Department of Architecture offers the course in collaboration with four other departments – Civil, Environmental and Geomatic Engineering; Information Technology and Electrical Engineering; Mechanical and Process Engineering; and Management, Technology and Economics as well as the Energy Science Center. The study programme aims to enable graduates with Bachelor's degrees in a construction-related or technical subject to gain gualifications in the areas of building systems, energy systems and building automation. One special feature is that the links between these knowledge areas are significantly stronger than at other institutions. The course places particular emphasis on translating knowledge and innovation into practice. Accordingly, in addition to courses in materials, building technology, simulation, project management and sustainability, students also attend courses in the field of microeconomics. Around 80 percent of teaching is carried out by ETH professors from participating departments, with additional contributions by external research and industrial partners. Potential employers for future graduates include large engineering companies, cantonal town planning departments and general contractors which design and construct entire building complexes.

### Flexible teaching

In addition to expanding its offering, ETH Zurich is making increasing use of new forms of teaching by putting in place the infrastructure needed to employ modern teaching methods. One step in this direction is the flexible auditorium which the university has installed in its main building. Thanks to its mobile fittings, the auditorium facilitates (inter)active and versatile forms of teaching. Tables and chairs can be moved easily and conveniently arranged to form "islands" for group work. The auditorium is also equipped with sliding whiteboards and blackboards, a fixed projector and two mobile screens. The new teaching room is particularly well suited to "flipped classroom" sessions, in which students start by working through the theoretical elements in their own time before attending a classroom-based seminar with lecturers to discuss and consolidate the concepts they have learned.

### More online courses

ETH Zurich has also expanded the range of online courses it offers. Following the intense discussion surrounding the topic of MOOCs (massive open online courses), ETH Zurich decided at the end of 2012 to launch a two-year initiative aimed at gathering experience with new, web-based course formats. An appropriate concept was developed for this project, using the acronym TORQUE as a deliberate contrast to MOOC. Short for "tiny, open-withrestrictions courses focused on quality and effectiveness", TORQUE refers to online courses which are primarily intended for students at ETH Zurich and are always linked directly to a degree programme at ETH Zurich. These new online formats allow for a broad range of new teaching scenarios. Eight different TORQUEs had been held by the end of 2014, on subjects including mathematics, physics, genetics and economics. In addition, the university has also run three MOOCs aimed at a large number of external participants on the topics of "Computing, Art, Magic, Science", "Future Cities" and "Autonomous Mobile Robots". The process of evaluating the findings of this pilot project began at the start of 2015.

www.ethz.ch/buildingsystems  $\rightarrow$ www.edx.org/school/ethx  $\rightarrow$ 

In 2013, the Swiss Center of Accreditation and Quality Assurance in Higher Education (OAQ) conducted a thorough audit of the quality assurance system in place at ETH Zurich, with the aim of assessing how ETH Zurich ensures quality in its research and teaching. The outcome of the final report presented in 2014 was very encouraging. It stated that ETH has a very broad definition of quality, encompassing not only evaluation procedures but all processes of relevance to guality, such as appointments of new professors and the awarding of research funding. Furthermore, ETH has a culture of quality which is firmly anchored in participatory and decision-making processes. However, the report also highlighted individual areas with room for improvement. ETH has taken the OAQ's recommendations on board and has, for example, set up working groups to come up with suggestions on how to implement the auditors' advice to speed up the process of integrating new assistant professors into the ETH community.

### Teaching evaluation

Quality assurance

of quality

A broad definition

### Changes to the evaluation process

As part of a system introduced some 20 years ago, lecturers at ETH Zurich receive regular, formalised feedback on students' perceptions of the courses they have taught. Four years ago, the university conducted an audit of the teaching evaluation process. Following a pilot phase, the process of surveying students was put back from the end of the semester to after the examination period. The surveys are now conducted online rather than on paper. Further changes were made in 2014 at the end of the three-year rollout period. In future, the evaluation will take place in two steps. As in the past, in the first year lectures and exercises will be evaluated at the end of the semester, and exams will then be evaluated in the second year. A further element of the new system is a concept known as semester feedback. This consists of a feedback discussion between students and lecturers regarding individual courses, held at the students' request, to enable the lecturers to make changes at short notice



The number of students increased again in 2014, and by the end of the year there were 18,616 women and men studying at ETH Zurich.

### Student numbers

### Growth in engineering sciences

Never before have so many new students enrolled at ETH Zurich. 2,657 young women and men began a Bachelor's degree at ETH Zurich. The proportion of women remains virtually unchanged, standing at 29.7 percent in total this year. The Food Science, Pharmaceutical Sciences, and Health Sciences and Technology courses have the highest proportion of women, at 74, 68 and 59 percent, respectively. The proportion of international students among the new Bachelor's students fell slightly to 12.6 percent.

Once again, the Mechanical Engineering degree programme attracted by far the most interest with 426 new entrants, followed by Architecture with 245 newly enrolled students. A trend reversal is becoming apparent in terms of the ranking of the other programmes. Computer Science as well as Electrical Engineering and Information Technology - two areas in which student numbers had fallen after the boom of the 1980s and 1990s - have regained popularity among first-semester students. With 235 enrolments, Computer Science was in third place on the popularity scale for new students this year. The next two places were occupied by the

Health Sciences and Technology degree programme introduced in 2011 (218 new entrants) and the Electrical Engineering and Information Technology programme, which registered 203 new entrants. The fact that student numbers have been rising steadily for years in the engineering subjects is very encouraging given the ongoing skills shortage.

### Increases also seen at Master's level

ETH Zurich is a very popular educational institution for Master's students, too. In 2014, some 1,550 graduates of Bachelor's degrees at ETH Zurich transferred to Master's programmes internally. They were joined by around 750 students who had completed their Bachelor's degrees at other universities. ETH seems to be a very attractive option for external students in particular, as a record figure of about 2,200 students applied for places on Master's degrees at ETH Zurich. Due to the high numbers of students transferring from the Bachelor's degree programme at ETH, Mechanical Engineering is also the largest programme at Master's level.

Since more new students enrolled on courses than withdrew or graduated, the

total number of students at ETH Zurich also increased again in 2014. Together with just under 4,000 doctoral students, there were 18.616 women and men studying at ETH Zurich at the end of the year.

There has been only a slight fall in the number of visiting and exchange students at ETH, which is remarkable given that Switzerland can no longer take part in the Erasmus+ programme and student exchanges are now organised under the Swiss-European Mobility Programme. In total, 522 visiting and exchange students spent one or two semesters at ETH Zurich (previous year: 575).

www.ethz.ch/rectorate  $\rightarrow$ 



### **ETH SUSTAINABILITY SUMMER SCHOOL**

Thirty-one students from all around the world attended the three-week ETH Sustainability Summer School entitled "Future Health" which addressed the topic of technological developments in the healthcare sector. Students also came up with suggestions for disciplines at the Cybathlon 2016 Championship, a sporting event where disabled athletes compete with the aid of mechanical and electric devices.

www.ethz.ch/sustainability-summerschool

### Student project

### Filter for clean water

Working with researchers from the Functional Materials Laboratory, ETH student Jeremy Nussbaumer developed an innovative filter that purifies water more quickly, simply and economically than ever before. The filter, which can be screwed onto any plastic bottle, doesn't require a pump or a reservoir, making it very easy to use. It filters water in three stages: A pre-filter captures large particles such as sand and plant fragments. The middle section consists of an activated charcoal powder that removes undesirable odours and chemical contaminants. The third and most important part of the filter is a polymer membrane that removes bacteria. Two ETH doctoral students developed this membrane and patented it three years ago.

The project team successfully raised additional money via a crowdfunding platform in order to continue development. Donations will be used primarily to manufacture filters for use in developing countries.

www.drinkpure-waterfilter.com >

### Scholarships

### More generous support

Like any form of education, studying at ETH Zurich costs money - although the high cost of living in Zurich is more of a burden than tuition and fees. The university provides needs-based scholarships as a way to ensure that young people from less privileged backgrounds can also study at ETH. Students receive these funds in addition to their other funding, for example from their cantons of residence or countries of origin.

To make these scholarships more effective, ETH has once again revised its regulations, which were last updated in 2009, and will be able to award needsbased scholarships more generously in the future. The university now interprets the assessment criteria less strictly and has reduced the requirements for academic progress. It has also extended the period during which students can draw scholarships and increased the maximum scholarship contributions. In addition, the university will be improving its communication, and will highlight the option of obtaining scholarships during pre-study events. Furthermore, students can now use an online scholarship calculator to find out immediately whether or not they are eligible for scholarships from ETH.

In addition to the needs-based scholarships, ETH Zurich has also expanded its programme of merit-based scholarships. Alongside the Excellence Scholarship and Opportunity Programme, which is open to applications from the best Master's students, the university now awards Master Scholarships as well. Although these are somewhat less generous than the Excellence Scholarships, they are also aimed at students who stand out on account of their excellent performance. This expansion will allow ETH Zurich to double the number of students it supports.

www.ethz.ch/scholarships  $\rightarrow$ 

### The Critical Thinking initiative

## Promoting analytical and reflective thinking

Hundreds of fresh ETH graduates come onto the jobs market every year. If they are to succeed in their professional lives, specialist knowledge alone is not enough they also need management skills and the ability to think critically and formulate arguments to back up their stance. ETH Zurich launched the Critical Thinking initiative with the aim of preparing its graduates for the issues they will encounter in their professional lives and in society and enabling them to see problems in a broader context. The initiative will make more extensive use of the resources already available in this area at ETH and firmly establish critical thinking as a key part of everyday life at the university.

### Seeing the bigger picture

In an initial step, a group of experts defined key qualifications in three areas: "analysing and reflecting", "developing a stance" and "communicating and acting responsibly". These qualifications were discussed in an April workshop with around a dozen representatives of the business community. Although the university and business representatives came to similar conclusions in many areas during the exchange, the latter also observed that trained scientists often have complete faith in science which can prevent them from questioning their own explanations. Seeing the bigger picture and reassessing one's own attitudes are key when it comes to working together in a company, and they also constitute a vital requirement for sophisticated, effective communication. The ability to form one's own opinion and then defend it in the face of resistance is something managers expect from all of their employees. They also rate the ability to question authority figures as an essential skill.

ETH ran a workshop in June in connection with these issues, attended by around 80 lecturers, students and administrative staff. Participants first got an overview of the ideas, measures and projects that already exist at ETH Zurich in the area of critical thinking. These include courses offered by the Department of Humanities. Social and Political Sciences, interdisciplinary summer schools, and teaching methods which use interactive elements to promote conceptual understanding and critical examination of course content.

Getting the ball rolling After this overview, participants then began to develop ideas on how the approaches used up to now could be integrated more fully into students' everyday lives. They also discussed new projects, such as a study week in which mixed teams of students come up with ideas for solving complex problems.

terest among both lecturers and students. The Executive Board would like to take advantage of this positive momentum and get the ball rolling as soon as possible. To drive the initiative forward, an annual programme was drawn up with a list of all courses and student-run initiatives which promote the development of critical thinking skills.

www.ethz.ch/critical-thinking-en  $\rightarrow$ 

### Other 148

Disability advisory service: 48

Motivation/ stress: 33

Reorientation/ alternatives: 183 Study plans: 115

Learning/

### ADVISORY FOR STUDENTS

The coaching programme offered by the Orientation & Coaching for Students (SoC) unit was established as a permanent part of ETH Zurich in 2014. The unit supports future students with their choice of course and tries to make the initial phase of their studies at ETH easier. SoC offers a broad range of information resources. ETH Zurich presents its study programmes at Swiss high schools as part of the "ETH in motion" event series. Information days and study weeks give prospective students an insight into what ETH has to offer, and pre-study events prepare new students for their programmes. SoC also provides individual support to both current and prospective students. In 2014, the SoC advisors held over 1,200 consultations with 1.034 individuals.

The initiative attracted considerable in-

### Golden Owl

### Prizes for excellent teaching

Once again on ETH Day in 2014, the students gave awards to those lecturers who had shown outstanding commitment to teaching. The Union of Students at ETH Zurich awards a Golden Owl to one lecturer from each department. In the Civil, Environmental and Geomatic Engineering department, students awarded the prize to the new ETH Rector Sarah Springman. The following lecturers from the other departments received prizes: Professor Andreas Tönnesmann (D-ARCH), Professor Sabine Werner (D-BIOL), Professor Mustafa Hani Khammash (D-BSSE), Professor Gisbert Schneider (D-CHAB), Professor Helmut Jürg Weissert (D-ERDW), Professor Andreas Wenger (D-GESS), Professor Nicole Wenderoth (D-HEST), Professor Ueli Maurer (D-INFK), Professor John Lygeros (D-ITET), Professor Jan-Egbert Sturm (D-MTEC), Professor Edoardo Mazza (D-MAVT), Professor Nicola Spaldin (D-MATL). Dr Meike Akveld (D-MATH), Professor Klaus Kirch (D-PHYS) and Dr Monika Maurhofer Bringolf (D-USYS). The Credit Suisse Award for Best Teaching 2014 went to Assistant Professor Michael Eichmair from the Department of Mathematics

### www.ethz.ch/owl $\rightarrow$



www.ethz.ch/student-orientation  $\rightarrow$ 

# Strategic partnerships

The good news came at the end of the year: ETH alumnus Hansjörg Wyss was to donate 120 million dollars to his alma mater and the University of Zurich. The new Wyss Translational Center Zurich (Wyss Zurich) will be set up with the aim of enabling knowledge from basic and pre-clinical research to be applied in practice more quickly. Other strategically important areas also benefited from donations. With one such contribution, ETH Zurich was able to set up a new chair for power semi-conductors as part of the Electrical Energy Initiative. In addition, donations in the fields of computer science and mobile device development enabled the university to enter into strategically interesting collaborations with industrial partners.

Cooperation with scientific partners also intensified in 2014. ETH Zurich took over leadership of another Swiss Competence Center for Energy Research, which has the objective of making industrial processes more energyefficient. The university is also the leader or co-leader for four of eight new National Centres of Competence in Research. ETH established a new competence centre in the area of personalised medicine, working with the University of Zurich and University Hospital Zurich, to reinforce its research in this area. The centre's vision is to be able to tailor diagnostic and treatment methods to individual patients.

ETH Zurich launched a new research project at the Singapore-ETH Centre for Global Environmental Sustainability. In the Future Resilient Systems project, the university is looking to investigate how to improve the resilience and adaptability of closely interconnected critical infrastructure systems.



Appointments at ETH Zurich by previous institution, as of 31.12.2014

SAI REDDY is a professor in the Department of Biosystems Science and Engineering. He started his position at ETH Zurich after a postdoc at The University of Texas at Austin in the US. Reddy is now the principal investigator at the Laboratory for Systems and Synthetic Immunology, where his research focuses on the interface of bioengineering and immunology for applications in vaccines and immunotherapy.





### FUTURE RESILIENT SYSTEMS

Closely interconnected critical infrastructure systems are the backbone of society. The Singapore-ETH Centre for Global Environmental Sustainability (SEC) in Singapore launched the Future Resilient Systems (FRS) project with the aim of making such systems more robust. The FRS project focuses on energy supply systems. (Image: an interactive tool which models the future of energy in Ethiopia.)

### www.ethz.ch/frs $\rightarrow$

### Collaborations

### Working together to achieve success

Collaborations with external partners expand fields of knowledge in strategically important areas and promote knowledge transfer between the university and industry. The same is true for donations. In addition to the generous donation that Hansjörg Wyss made to ETH and the University of Zurich (see following page), ETH Zurich received numerous other donations. As part of the Electrical Energy Initiative, for example, it was able to set up a new chair for power semi-conductors. ABB is kickstarting the new chair in the Department of Information Technology and Electrical Engineering with a donation of five million Swiss francs to the ETH Zurich Foundation, spread over ten years. Modern power semi-conductors reduce losses by enabling highly efficient conversion of electrical energy. Research on power semi-conductors is becoming more important, especially in light of the growing role that electricity from renewable energies plays in the electricity grid.

Over the coming decade, a donation of one million Swiss francs from the Zurich-based company Hocoma will provide financial support for a new chair for rehabilitation and health sciences in the Department of Health Sciences and Technology. The Department of Health Sciences and Technology at ETH Zurich has enjoyed a close, successful working relationship with Hocoma for 15 years. One result of this

collaboration is the arm rehabilitation robot Armin, which is used in the rehabilitation of stroke patients.

The current collaboration between Google and ETH Zurich also revolves around products that will soon make our lives easier. As part of the Tango project, Google is working with various institutions including ETH Zurich to develop mobile devices that can detect surroundings in three dimensions and enable indoor navigation. The first devices are expected to hit the market next year. Furthermore, ETH Zurich and EPF Lausanne have entered into a new research partnership with Microsoft Research. Microsoft Research is providing five million Swiss francs of funding to support IT projects at the two universities.

In light of the growing importance of research partnerships, ETH Zurich has adopted a new Code of Conduct for Scientific Cooperation, which sets out ETH Zurich's fundamental ethical standards for cooperation and is intended to serve as a basis for evaluation in cases of doubt.

www.ethz.ch/sponsors-partners  $\rightarrow$ 

### National competence centres

### ETH setting the tone

In 2014, ETH Zurich took over leadership of another Swiss Competence Center for Energy Research, which has the objective of making industrial processes more energyefficient. This stems from the Swiss Parliament's decision in 2013 to increase funding for energy research in Switzerland, creating eight Swiss Competence Centers for Energy Research (SCCERs) as the core of the support measures. All eight research centres involve a collaboration between standard universities, universities of applied sciences and industrial partners. ETH Zurich is now managing three of the SCCERs. In addition to the new Efficiency of Industrial Processes centre, these are the Electricity Supply centre and the Efficient Concepts, Processes and Components in Mobility centre.

ETH Zurich is also playing an important role in the new National Centres of Competence in Research (NCCR), serving as either leader or co-leader of four of the eight new NCCRs. All four programmes in which ETH Zurich is involved as a leading institution - digital architecture, biomedical groundwork, molecular engineering and mathematical physics - have the potential to make a long-term impact on the research and innovation landscape in Switzerland.

www.ethz.ch/initiatives  $\rightarrow$ 

### University medicine in Zurich

### New competence centre

The University of Zurich and ETH Zurich have founded a competence centre for personalised medicine. The centre's vision is to tailor diagnostic and treatment methods to individual patients on the basis of their genetic make-up.

The close collaboration between scientists and medical professionals from the University of Zurich, University Hospital Zurich and ETH Zurich will transform Zurich into an academic centre of national and international renown in the field of personalised medicine.

www.ethz.ch/personalised-medicine  $\rightarrow$ 

### Wyss Zurich

### Faster application in practice

ETH Zurich and the University of Zurich are founding the Wyss Translational Center Zurich (Wyss Zurich), thanks to a 120 million dollar donation that Hansjörg Wyss has made to the ETH Zurich Foundation. The central idea and motivation behind the initiative are to ensure that knowledge from basic and pre-clinical research can be applied in practice more quickly; in other words, an efficient translation into new medical therapies and innovative products.

Wyss Zurich will initially include two technology platforms: one for regenerative medicine and another for robotics. The centre will bridge disciplinary and institutional barriers and unite researchers across various disciplines, ranging from engineering and medicine through to materials science, stem cell research and robotics. Professors Roland Siegwart from ETH Zurich and Simon P. Hoerstrup from the University of Zurich will serve as the centre's co-directors.

Breast cancer

### Improvement in early detection

Phase-contrast X-ray imaging has enabled researchers at ETH Zurich, the Paul Scherrer Institute and the Kantonsspital Baden to perform mammograms that allow greater precision in the assessment of breast cancer and its precursors. One of the advantages of the new technique is that it provides extremely sharp images with high levels of detail and contrast. This makes it possible to distinguish between two types of calcification which occur in the breast without a complicated biopsy. Calcifications usually occur in places where rapidly dividing cells die, and are therefore often associated with early stages of breast cancer. Traditional mammography does not allow definite conclusions regarding the causes of calcifications, so physicians can only make a diagnosis by doing tissue biopsies. This new technique could help doctors to determine where premalignant and malignant breast lesions are most likely located without the need for invasive measures.

www.ethz.ch/wyss  $\rightarrow$ 

www.ethz.ch/x-ray-imaging  $\rightarrow$ 



### ACID SENSOR CONTROLS INSULIN PRODUCTION

Type 1 diabetes patients produce no insulin. As a result, their cells cannot use alucose for energy – so they use fat reserves instead. This, however, produces an acid which causes the blood's pH level to fall. If the lack of insulin is not treated in time, patients can die from a condition known as ketoacidosis. A team of ETH bioengineers has now developed a new implantable molecular device which constantly measures the blood's acidity and produces insulin when required. Initial testing in mice has been successful

www.ethz.ch/acid-sensor  $\rightarrow$ 

### New medication

### A successful treatment for arthritis

In collaboration with the ETH spin-off Philochem, a team of ETH researchers headed by the Institute of Pharmaceutical Sciences Professor Dario Neri has developed a treatment that cured chronic rheumatoid arthritis in mice. Current medications are only able to slow or stop the progression of the disease in patients.

One component of the new active substance, which was produced using biotechnology, is the body's own immune messenger interleukin 4. Previous studies have shown that this substance protects mice with rheumatoid arthritis against cartilage and bone damage. ETH scientists have coupled the messenger to an antibody which carries it to the inflamed tissue. When researchers administered the new active substance together with the cortisone-like drug dexamethasone they were able to cure the animals. The scientists are now planning to test the drug's efficacy in humans.

www.ethz.ch/biomacromolecules  $\rightarrow$ 

### Glaucoma

### Eye-catching electronics

Scientists in Professor Gerhard Tröster's Electronics Lab develop flexible electronic components such as transistors and sensors. The ETH researchers see a potential area of application for their flexible electronics in contact lenses which measure intraocular pressure. Intraocular pressure is a key risk factor for developing glaucoma, a disease which can cause total blindness.

Researchers attached thin-film transistors in combination with strain gauges to standard contact lenses. They placed these on an artificial eye and tested whether the membrane, and particularly the electronics, could withstand the bending radius of the eve. The tests showed that this type of contact lens does indeed function and could be used to measure intraocular pressure.

www.ethz.ch/flexible-electronics  $\rightarrow$ 

### GLUCOSE (insulincontrolled)

### Simulation model

### Mantle plumes crack continents

Using a simulation with an unprecedentedly high resolution, Taras Gerya, a professor of geophysics at ETH Zurich, and a French researcher have shown that magma columns in the earth's interior can cause continental breakup – but only if the earth's skin is already taut. The two researchers conducted numerical experiments to reproduce the earth's surface above a plume in high-resolution 3D.

"Mantle plumes" or simply "plumes" are what specialists call magma columns which rise hundreds of kilometres from the boundary layer of the earth's core and its lower mantle to just below its crust. Halted by the resistance of the hard crust, the flow of material becomes wider and takes on the shape of a mushroom. Geologists believe that plumes can break up continents. However, because such processes take place over enormous lengths of time, nobody has been able to confirm or disprove plumes' continent-cracking force with absolute certainty.

### First high-resolution simulations

Simulations now show, however, that the rising flow of material is indeed strong enough to cause continental breakup if the tectonic plate is under tensile stress. Using a model, the researchers allowed the plumes to hit an unstressed plate, which did not cause it to break, but merely formed a round hump. However, when the geophysicists modelled the same process with a plate under weak tensile stress, it broke apart, forming a crevice and rift system like those found in nature.

The two scientists are the first to use such a high-resolution model to demonstrate how a plume interacts with a plate under tensile stress.

www.ethz.ch/qfd  $\rightarrow$ 

### New materials

### Ultra-fast computer hard drives

Some materials can be magnetised not only by exposing them to an external magnetic field, but also by applying a voltage. In the future, it may be possible to use these substances - which are known as multiferroics - in computer storage media. In today's devices data is written onto a computer's hard drive using a mechanical magnetic head, but in the future multiferroic hard drives could be inscribed electrically at a much faster rate.

An international team including a group of researchers led by ETH Professor Steven Johnson and scientists from the Paul Scherrer Institute has now found experimental evidence that the ordering of the magnetic moments in multiferroics can also respond much more quickly to voltage - in less than a billionth of a second, i.e. one thousand times faster than the speed at which data can be written onto a hard drive today.

Specifically, the scientists studied the material terbium manganite. Its multiferroic properties were only discovered around a decade ago and since then physicists have used it as a model material for researching these properties. In measurements made with a free-electron laser at Stanford University in California, the researchers from Switzerland demonstrated that the magnetic moments in a millimetresized crystal of this material change direction within 200 femtoseconds after a particular electrical excitation. These research results raise hopes that it will be possible to produce ultra-fast computer hard drives from such materials in the future.

www.ethz.ch/ultrafast-dynamics  $\rightarrow$ 

### Lactic acid **Making bioplastic** from waste

The research groups of ETH professors Konrad Hungerbühler and Javier Pérez-Ramírez have developed a method of manufacturing lactic acid for use in plastics production. Their method's greatest advantage is that it makes use of glycerol, a waste by-product in the production of certain biofuels.

The ETH researchers generate the lactic acid in a two-step process using a highperformance catalyst they have developed. Their process is more productive, costeffective and environmentally friendly than sugar fermentation, which is the method currently used to produce lactic acid.

### www.ethz.ch/icb-en $\rightarrow$



### **PRODUCING KEROSENE FROM SUNLIGHT**

Researchers have for the first time successfully demonstrated the entire production chain for the liquid fuel kerosene using water, CO<sub>2</sub> and solar energy. The key component in the Solarjet project is a solar reactor developed at ETH Zurich.

www.ethz.ch/solarjet  $\rightarrow$ 

Corrosion damage

### Inspecting bridges with a robot

A robot developed by scientists at the Institute for Building Materials in collaboration with the Institute of Robotics and Intelligent Systems can check bridges for corrosion damage even in places that are difficult or impossible for people to reach. A type of propeller attached to the underside of the robot rotates fast enough for a movable suction cup to stick the robot onto walls, where it can then use its wheels to move along these surfaces. In order to detect corrosion damage, the robot is equipped with an electrode for measuring differences in electrical potential, a method which is already used successfully in the inspection of bridges.

www.ethz.ch/building-materials  $\rightarrow$ 

### X-ray crystallography

### Polymer in two dimensions

A group of materials scientists headed by Professor Dieter Schlüter has developed polymers with repeating units that join up in exactly two dimensions. Two years ago, the ETH researchers at the Polymers Institute created the very first flat synthetic polymer of this kind. They have now managed to produce a 2D polymer whose structure can be elucidated using X-ray crystallography, thereby providing the first direct evidence that synthetic two-dimensional polymers actually exist.

In the case of the ETH researchers' 2D polymer, the individual molecules - the monomers - are shaped like nanometresized cylinders with three wings. To create flat polymers, the researchers have the monomers crystallised, causing them to arrange themselves in a regular crystal lattice. When the crystals are irradiated with UV light, the wings of the different monomer units react with one another, creating a sheet-like crystal consisting of individual lavers stacked on top of each other. This method enables the production of synthetic. nanometre-thin sheets that are similar to the promising material graphene.

www.ethz.ch/polymer-chemistry  $\rightarrow$ 



# Graphene

Graphene is often referred to as a "super material". Using this substance, a team of researchers led by Professor Hyung Gyu Park at the ETH Department of Mechanical and Process Engineering has produced a stable porous membrane which is less than a nanometre thick - 100.000 times thinner than the diameter of a human hair. The membrane consists of just two layers of graphene and is therefore the thinnest porous membrane that it is technologically possible to make. The scientists etched tiny pores of a precisely defined size into a two-dimensional film made of carbon atoms. As a result, the membrane can be

Depiction of the two-layer graphene membrane (grey honeycomb structure) with molecules (blue) which - depending on their size - can pass through the pores.

### Thinnest possible membrane

permeated by the very smallest molecules. Larger molecules or particles, on the other hand, can pass through it only slowly if at all.

Potential uses range from the separation of gaseous mixtures and the filtration of liquids to functional waterproof clothing. The membrane is light, flexible and a thousand times more breathable than Goretex.

www.ethz.ch/energy-technology  $\rightarrow$ 

# Successful knowledge transfer

More than 300 spin-offs have emerged from ETH Zurich since 1996, including 22 in 2014 alone. The companies originating at ETH are among the most successful start-ups in Switzerland. This is demonstrated not only by the numerous awards they have received: some of them are also highly sought after by major companies in search of acquisitions. One such example is the ETH spin-off Covagen, which was acquired for over 200 million Swiss francs.

Development opportunities are essential for new companies. It is therefore very encouraging that the establishment of the Dübendorf innovation park – a process in which ETH Zurich is also involved – is proceeding according to plan. In the summer of 2014, the Federal Council, the Canton of Zurich and the town of Dübendorf laid the political, planning and organisational foundations for the park's development. On the site of today's airfield, an area covering roughly 70 hectares, a "knowledge biotope" will be created for communication and interaction between science and industry. The ETH Zurich-run Swiss National Supercomputing Centre (CSCS) in Lugano successfully put another supercomputer into operation for use in research. "Piz Daint" is not only the most powerful supercomputer in Europe, it is also the world's most energy-efficient computer in the petaflops performance category.

Finally, the Swiss Seismological Service (SED) can also look back on a successful year. It has been the official federal agency for earthquake monitoring in Switzerland since 1914. In its anniversary year, the SED offered the general public insights into its activities.



PIONEER FELLOWSHIPS: A SUCCESS STORY 2010–2014

MATTIAS IVARSSON has developed a molecule which combats one of the most common hospital bugs, the bacterium *Clostridium difficile*. For his work in this area, ETH Zurich has awarded him a Pioneer Fellowship: a grant which the university offers to support young researchers in developing innovative products or services. The new molecule has already been tested successfully and patented.



Top 100

### ETH in the fast lane

New companies that emerge from ETH Zurich have excellent chances of success. This was once again confirmed by the announcement of the year's 100 most promising spin-offs named by the Institut für Jungunternehmen (IFJ). The top 100 Swiss start-ups for 2014 included 18 ETH spinoffs, three of which – InSphero, Climeworks and Dacuda – finished in the top ten.

### www.startup.ch/top100 $\rightarrow$

Venture 2014

### A record year for business ideas

ETH Zurich, Knecht Holding, the Commission for Technology and Innovation (KTI) and McKinsey & Company Switzerland held the venture start-up competition for the ninth time. In total, 239 teams submitted their business idea – an absolute record in the history of the competition. During the competition's second phase, 141 teams handed in detailed business plans. Two teams from ETH Zurich, Rgmicro and Versantis, finished among the top ten winning projects.

www.venture.ch  $\rightarrow$ 

### Spark Award

### High-performance storage technology

Bright ideas with a lot of market potential - this is precisely what ETH Zurich's annual Spark Award represents. Jennifer Rupp, professor for electromechanical materials, Sebastian Schweiger and Felix Messerschmitt won this year's competition for the most promising patent application by ETH researchers. They are developing a concept for a very powerful and efficient memory module that may lead to a new generation of data storage devices. such as flash memory in USB sticks or central memories in computers.

www.ethz.ch/sparkaward  $\rightarrow$ 

### Support for spin-offs

### Innovative spirit with long-term impact

More than 300 spin-offs have emerged from ETH Zurich since 1996, including 22 in 2014 alone. This means that the rate of founding companies has remained consistently high since the record year of 2009, in which 24 new companies were established. Encouragingly, the companies founded at ETH are among the most successful start-ups in Switzerland. Not only have these companies won numerous awards, some of them are also highly sought after by major companies in search of acquisitions. By way of an example, a subsidiary of Johnson & Johnson acquired the ETH spin-off Covagen in 2014 for a purchase price of over 200 million Swiss francs. Founded in 2007 by doctoral students from a group led by ETH Professor Dario Neri, the spin-off develops innovative pharmaceutical products to treat cancer and inflammatory diseases.

Researchers in the fields of medical technology and life sciences have repeatedly shown the capacity for impressive innovation in recent years. The year 2014, however, was characterised by an especially large number of new companies from the ICT (six ETH spin-offs) and mechanical engineering (five ETH spin-offs) sectors. Three of these companies emerged from the chair for control technology headed by Professor Raffaello D'Andrea, who himself has achieved considerable success as a company founder.

Hot spots for young entrepreneurs Roland Siegwart, vice president for research and corporate relations at ETH Zurich until the end of 2014, knew that a supportive environment and good role models can foster entrepreneurial spirit. With the Pioneer Fellows programme launched in 2010, ETH Zurich has been providing stipends to students seeking to develop a highly innovative product after completing their Master's degrees or doctorates. Forty-seven Pioneer Fellowships were awarded in 2014. In addition, ETH founded two Innovation and Entrepreneurship Labs (ieLabs) in 2012 and 2013. Here, young researchers - like Pioneer Fellows, for example - develop initial prototypes and receive support from experienced coaches in industry. In 2014, ETH launched the ETH Founders Community in order to facilitate exchange among founders of ETH spin-offs over the long term.

www.ethz.ch/pioneer-fellowships  $\rightarrow$ www.ethz.ch/ielab-en  $\rightarrow$ www.ethz.ch/founderscommunity  $\rightarrow$ 



More than 300 spin-offs have emerged from the university since 1996, including 22 in 2014. Most were founded in the information and communications technology and electrical engineering sectors.



Visualisation of the project from the existing entrance to the Dübendorf airfield.

### Swiss Innovation Park

### A hotbed of knowledge and innovation

Switzerland is setting up a national innovation park with a hub located in Dübendorf. The Federal Council and the cantonal governments took some important basic decisions on this project in 2014. ETH Zurich has supported the innovation park in Dübendorf since 2004 with planning, comparison and feasibility studies, and the university is now collaborating closely with the project leader, the Swiss Innovation Park association, and the cantons in working out the project's specific details. Roman Boutellier, vice president for human resources and infrastructure, is representing ETH Zurich on cantonal and national planning committees.

The innovation park will create a "know-

ledge biotope" on the site of today's mili-

tary airfield in Dübendorf starting in 2016,

facilitating communication and interaction

between science and industry. On an area

of around 70 hectares, university research-

ers will one day work together with estab-

lished international companies in order to

quickly transform research results into

Council, the Zurich cantonal government

and the Dübendorf town council laid the po-

litical, planning and organisational founda-

tions for the park's development. The re-

In the summer of 2014, the Federal

marketable products.

quired changes to the structure plan will be discussed and approved by the parliament of the canton of Zurich and the federal government in 2015. In addition, the Federal Council is submitting a dispatch to parliament on the specific nationwide design and the organising institution of the innovation park. Parliament will decide on this matter in 2015.

### Establishing a national network

Alongside Lausanne, Dübendorf is one of two hub locations in a nationwide innovation network which will operate under the shared umbrella brand of the Swiss Innovation Park and serve as an international guality label for the Swiss research and innovation centre. The two hubs are situated in the vicinity of ETH Zurich and EPF Lausanne and form the network's international poles. Two additional network sites are currently scheduled to be launched in 2016: one project organised by the canton of Aargau in collaboration with the Paul Scherrer Institute (PSI) and one project in Northwestern Switzerland which also involves the ETH Department of Biosvstems Science and Engineering (D-BSSE).

The Dübendorf hub will not be a new site of ETH Zurich, but a physically and organisationally separate location for knowledge transfer from universities to companies.

### WEF in China

### ETH ideas for resilient systems

Participants from more than 90 countries including leading figures from the worlds of business, politics and science – exchanged ideas about the future at the Annual Meeting of the New Champions event at the World Economic Forum (WEF) in China. A delegation of ETH researchers led by ETH President Ralph Eichler presented innovative ideas on the topic of resilient systems. The ETH Zurich IdeasLab focused on the question of how the world could better face emerging global risks. ETH professors reported on the latest approaches used by the Singapore-ETH Centre, the ETH Risk Center, risk and insurance economics, and climate research experts to develop resilient systems.

In addition, Jennifer Rupp, professor of electrochemical materials, was able to present her research on innovative energy storage and energy-saving transistors as one of the 40 World Economic Forum 2014 Young Scientists.

www.ethz.ch/wef-china  $\rightarrow$ 

### CSCS

### Europe's most powerful supercomputer

The ETH Zurich-run Swiss National Supercomputing Centre (CSCS) in Lugano has been operating Europe's most powerful supercomputer, "Piz Daint", since the end of 2013. A Cray XC30, Piz Daint has a theoretical maximum processing power of 7.8 petaflops and performs 3.2 billion computing operations per watt, making it the world's most energy-efficient supercomputer in the petaflops performance category. ETH Board President Fritz Schiesser and ETH President Ralph Eichler officially inaugurated the new computer for use in research on 21 March 2014.

Researchers from national and international institutions can apply for computing time on Piz Daint. In addition to standard projects, Piz Daint can also run CHRONOS projects (computationally intensive, highimpact research on novel outstanding science); these are projects which are expected to have a major scientific impact and which can only be managed on powerful supercomputers. Initial results from a project of this kind in the field of astrophysics were already published in September in a prominent scientific journal.

### Optimal infrastructure usage

CSCS also functions as a user lab, operating data storage systems and smaller supercomputers which specialise in areas including big data analytics. Projects such as the Platform for High-Performance and High-Productivity Computing (HP2C) and the follow-up project Platform for Advanced Scientific Computing (PASC) ensure optimal usage of CSCS's computer infrastructure. Both projects were launched as part of the High-Performance Computing and Networking (HPCN) strateqy set up in 2009. Scientists and other specialists from the area of high-performance computing are working on various projects in collaboration with CSCS and computer manufacturers. Together they are designing new application software for scientific simulations and more efficient simulation systems.

In addition, CSCS also operates computers dedicated to special tasks, such as the daily MeteoSwiss weather forecast, the analysis of data obtained from CERN's Large Hadron Collider at the Swiss Institute of Particle Physics, and the Blue Brain Project at EPFL. In order to better manage the continually increasing data quantities, in autumn 2014 CSCS became the first scientific service provider - alongside CERN with a network connection capable of processing 100 gigabits of data per second.

### www.cscs.ch $\rightarrow$



The processing power of the supercomputers at CSCS has grown enormously over the past 20 years, while the increase in energy consumption has been much less pronounced. This makes the Cray XC30 not only much faster than its predecessors, but also far more energy-efficient.

Congressi Stefano Franscini

### Twenty-five years of excellence

Congressi Stefano Franscini (CSF) has been hosting successful conferences on idyllic Monte Verità near Ascona for more than 25 years, events known for their scientific excellence, international character and openness. Known as Centro Stefano Franscini until April 2014, CSF is ETH Zurich's conference platform and provides financial support for up to 25 scientific conferences per year. In addition, CSF organises and finances events for the general public. To mark its 25th anniversary, CSF invited Ticinese schoolchildren to Monte Verità to learn more about science.

www.ethz.ch/csf-en  $\rightarrow$ 

### Archives and collections

### Making ETH's cultural assets accessible

ETH Zurich's Collections and Archives are of international importance, both as reference collections for current research and for studying issues related to the history of science. Preserving and developing this cultural heritage is a national responsibility that forms part of the university's basic mission. To strengthen the reputation of the Collections and Archives, the Executive Board of ETH Zurich has adopted a strategy for 2015 to 2020 and allocated funds for projects focusing on digitising these cultural assets and improving their accessibility. Continual improvements will be made to the structures for managing, maintaining and developing the collections and archives, as well as for curation and conservation.

ETH-Bibliothek is the competence centre at ETH Zurich for metadata management and high-quality digitisation of large guantities of data. It will therefore take on a leading role in the process of preparing and distributing the holdings of ETH Zurich's collections and archives. The strateav offers an opportunity to work together with the departments on projects which bring the collections and archives a visibility that is commensurate with their importance, both among the general public and in the scientific community.

www.ethz.ch/library  $\rightarrow$ 



The exhibition "unforeSeeable - Earthquakes in Switzerland" offered exciting insights for young and old.

### Seismological Service

### 100 years of earthquake research

The Swiss Seismological Service (SED) at ETH Zurich has been responsible for earthquake monitoring in Switzerland since 1914. As the official federal specialist agency, the SED carries out many different tasks. It maintains a highly sensitive measuring network to monitor earthquake activity in Switzerland and is responsible for estimating the country's seismic hazard. The SED is also heavily involved in research and teaching at ETH Zurich and provides seismic monitoring services to industry and the authorities, for instance for geothermics projects. In addition, it serves as a professional point of contact for the media and the public in the event of major earthquakes.

### Special exhibition

The SED celebrated its centenary with various activities. At an open day, researchers demonstrated how their activities contribute to the safety of the public. A special exhibition entitled "unforeSeeable - Earthquakes in Switzerland" at the focusTerra museum provided the public with insights into the natural hazard that has the greatest potential to cause damage in Switzerland. During its anniversary year, the SED published monthly interactive snapshots on its website every month showing unusual. new and exciting aspects of the subject of earthquakes.

In addition to the year's anniversaryrelated activities, the SED added ten stations to the strong-motion monitoring network

and continued modernising the broadband network in 2014. In March, it completed the expansion of the earthquake-measuring network in Northeast Switzerland. The extended measuring network improves the detection of seismic activity in the vicinity of the radioactive waste disposal sites proposed in the Sectoral Plan for Deep Geological Repositories.

www.ethz.ch/sed-en  $\rightarrow$ 

### Zurich meets New York Visiting the Big Apple

Between 16 and 23 May 2014, Zurich showcased its innovative side in New York, with the University of Zurich and ETH Zurich both playing prominent roles. An exhibition and a special metro station at Grand Central Station in the American metropolis grabbed commuters' attention, as MetroNeXt invited visitors to take a virtual tour from the centre of New York right into the heart of Zurich. At an ETH Zurich event, those in attendance were offered an opportunity to get to know researchers from students to Nobel Prize-winner Kurt Wüthrich, Finally, ETH Rector Lino Guzzella joined other runners in Central Park to try out a running shoe developed by ETH engineers that has already caused guite a stir in sporting circles.

### Public events

### First-hand research

ETH Zurich continued its dialogue with the general public at numerous events in 2014, not just by presenting its latest research but also by responding to critical questions.

On 10 May, an open day was held at the ETH Department of Biosystems Science and Engineering and the University of Basel Biozentrum, giving the public an opportunity to take a look round. As they toured the laboratories, visitors found out about the fascinating projects researchers are currently working on.

### Mobility and high performance

In Zurich, the Treffpunkt Science City event series offered insights into the university's varied scientific work. The spring edition featured numerous events on the subject of "Total mobility – constantly on the move in space, time and thinking", while in the autumn, "High performance in humans, nature and technology" attracted a record number of over 8.000 science enthusiasts to ETH.

### Health and climate change

Two additional events also focused on direct dialogue with the public and representatives of authorities, companies and institutions outside ETH Zurich. At the ETH Health Talk, ETH researchers presented scientific findings from medical and biological research and answered critical questions from representatives of society and the healthcare industry.

The 2014 "ETH-Klimarunde" event tackled the guestion, "Climate change innovation: what is needed for us to be able to act?" Initially, those interested were able to discuss their own questions with ETH researchers as part of round-table conversations. Then a group of leading thinkers from the worlds of science, private business and politics discussed how Switzerland could contribute to solving these problems.

www.ethz.ch/treffpunkt-en > www.ethz.ch/health-talk  $\rightarrow$ www.ethz.ch/klimarunde-2014  $\rightarrow$ 

# Changes in the university district

Growing numbers of students and researchers, together with the university's success in obtaining third-party funding, have made it increasingly challenging to manage ETH Zurich's financial resources in recent years. To ensure that these processes are as efficient and effective as possible, ETH Zurich is pursuing a policy of systematic digitisation.

As staff numbers grow, so too does the demand for space. Following a four-year construction period, ETH Zurich opened a new building in mid-October, the first in the central university district for 20 years. The LEE building on Leonhardstrasse has space for a total of 450 workstations and stands out for its environmentally friendly design. Like ETH Zurich, the University of Zurich and the neighbouring University Hospital Zurich are also growing continuously, which has often stretched infrastructure in the central Zurich university district to its limits. The governing council of the Canton of Zurich, the Zurich City Council and the three participating institutions approved the master plan for the university district in Zurich's city centre in September. The plan details the perspectives for the structural and spatial development of the entire university district, thereby forming an important basis for future planning.



HEAT RECOVERY AT ETH ZURICH 2010–2014



**DOMINIK PLANZER** was responsible for purchasing and installing the new HEI 06 heat pump as head of construction projects in the Real Estate infrastructure division. The pump, which went into operation in 2014, helps to make good use of the waste heat generated by the university's computers. It produces approximately 50 percent of the energy needed for heating the ETH buildings on the Zurich Zentrum campus, thus making a significant contribution to reducing the university's CO<sub>2</sub> emissions.

### Finance and controlling

### Efficient use of financial resources

ETH Zurich continued to grow in 2014, recording further increases in the numbers of both students and researchers. This development was also reflected in the key financial figures. The university's overall expenditure in 2014 came to 1,556 million Swiss francs (up by 2.9 percent compared to 2013). Around three guarters of this expenditure was covered by the federal financial contribution (FFC), with the remaining 346 million Swiss francs coming from thirdparty funding.

Looking at developments over recent years, it becomes apparent that ETH Zurich has enjoyed great success in obtaining third-party funding in particular. Contributions from EU projects almost trebled between 2006 and 2014, and funding from national organisations (SNSF, CTI, etc.) was up nearly 100 percent during the same period. This encouraging trend does pose increasing challenges when it comes to managing the university's financial resources, however. ETH Zurich is now pursuing a policy of systematically digitising its working processes in order to ensure that the available funds are used as economically as possible while at the same time minimising the administrative burden on

professors. The ETHIS information and support system was expanded to include additional workflow processes in 2014. This system now provides an efficient way of managing all aspects of research funding, expenses, equipment purchasing, services and credit card bills, thus bringing about a further substantial improvement in the quality and security of working processes.

### A valuable ETH initiative

The "KoBe ETH+" initiative – "Koordinierte Beschaffung im ETH-Bereich + Partner" (coordinated procurement within the ETH Domain + partner) - is also instrumental in helping to ensure the efficient use of financial resources. It was launched ten years ago and has since been implemented with great success under the leadership of ETH Zurich. The partners in this voluntary network, which was set up at the initiative of the ETH Board, include the two universities ETH Zurich and EPF Lausanne: PSI. EMPA, WSL and EAWAG, the four research institutes within the ETH Domain; and the University of Zurich.

The objectives of KoBe ETH+ are to professionalise procurement processes and utilise potential cost-cutting and optimisa-

tion measures in the area of procurement without restricting the partners' autonomy. By coordinating strategic procurement planning, the members can save considerable sums of money when it comes to purchasing various goods and services. One key element is the regular exchange of experiences, which increases transparency and helps the institutions to negotiate more favourable conditions with their suppliers.

In the last two years, for example, the prices charged by a large life science and chemicals supplier have been harmonised within the KoBe ETH+ environment and significant discounts have been negotiated on certain groups of materials. Negotiations with another laboratory materials provider have also been successful. These two examples alone have generated total recurring savings of close to 750,000 Swiss francs, additional funds which are now available to the members of KoBe ETH+ for use in teaching and research.

www.ethz.ch/finance-controlling  $\rightarrow$ http://kobe-eth.epfl.ch →

9.6%

33.4%

5.7%

12.2 %

39.0 %



### DEVELOPMENT AND STRUCTURE OF ETH ZURICH'S INCOME

28

A look at the changes in ETH Zurich's income shows the growing importance of third-party funding. This is mainly earmarked funding and primarily benefits research. When it comes to the education provided, or developing the infrastructure, on the other hand, it is usually not possible for third-party funding to replace the basic funding from the federal government. That is why steady growth in the federal financial contribution is absolutely essential if ETH Zurich is to be sustainably financed.

### Equal opportunities

### Gender balance

The Executive Board of ETH Zurich wants to establish a gender balance at all levels of the academic career ladder. It set out the specific steps it is going to take to achieve this objective in its Gender Action Plan at the start of the year. The Action Plan lists specific career development measures for every level of academia, from prospective students to tenured professors. It also details ways of improving employees' and students' work/life balance, for example through flexible employment opportunities and a good range of childcare services. In addition, more attention will be given to gender-specific factors in research and teaching. Men and women are interested in different research topics, and these interests motivate them to choose a particular university course or career. Taking greater account of women's interests will enable the university to attract more female students, as has been the case in the new Health Sciences and Technology degree programme, for instance. Finally, the Gender Action Plan emphasises that sexual harassment and discrimination will not be tolerated at ETH Zurich.

www.ethz.ch/equal-en  $\rightarrow$ 

A positive preliminary

The State Secretariat for Economic Affairs

(SECO) is carrying out an audit of ETH Zu-

rich in 2014-15 to verify compliance with

occupational health and safety regula-

tions. The audit is being conducted using

spot checks and will include all depart-

ments and the central governing bodies. In

an initial phase, the USYS, MAVT, ITET,

INFK and MATH departments and the First

lab were assessed in 2014. Aside from

a few minor criticisms, the results of the

audit were extremely positive. SEC0 is

basing its audit on a concept comprising

ten elements which cover everything from

the safety mission statement to occupa-

tional health promotion.

www.ethz.ch/squ-en  $\rightarrow$ 

Health and safety

assessment



### **NEW ETH BUILDING OPENED**

Following four years of construction, ETH Zurich opened a new building in mid-October, the first in the central university district for 20 years. The LEE building on Leonhardstrasse offers a total of 450 workstations for ETH Zurich's Department of Mechanical and Process Engineering and the Swiss Economic Institute. The building is distinguished by its innovative technical facilities and environmentally friendly design, and was constructed and certified in accordance with strict Minergie ECO guidelines.

www.ethz.ch/lee-en  $\rightarrow$ 

## 2014 master plan approved

The University Hospital, the University of Zurich and ETH Zurich are growing all the time, and increasing numbers of students, patients and employees are testing the limits of the existing infrastructure in the central Zurich university district. At the same time, numerous older buildings no longer meet modern infrastructure requirements. These developments mean there is a great need for expansion and renovation, which in turn requires careful area planning. Two key processes in the establishment of planning rights were successfully completed at the beginning of September, when the governing council of the Canton of Zurich, Zurich City Council, the University Hospital, the University of Zurich and ETH approved the master plan for the university district in Zurich's city centre along with two in-depth town planning studies. The 2014 master plan details the per-

spectives for the structural and spatial development of the three participating institutions and for the university district as a whole. It is the result of close collaboration between the institutions. local area representatives and authorities, and specialist agencies from the city and Canton of Zurich that began in 2012, and forms the basis for the revision of the structure plan for Zurich's central university district. It



### Central Zurich university district

specifies the locations of possible new construction areas and future focus points for teaching, research and healthcare provision. The master plan demonstrates that the area currently in use could be expanded by around 40 percent. The hospital park will be retained as an important recreational space and will undergo a major upgrade. An additional open space will be provided in the form of Neue Sternwartstrasse, which will link Universitätsstrasse and Gloriastrasse and will be primarily reserved for use by pedestrians and cyclists.

In addition to the master plan, two indepth studies conducted by the city and Canton of Zurich in conjunction with the participating institutions demonstrated that the spatial plan set out in the master plan can be implemented in a way that is compatible with town planning requirements. The two studies provide a 3D illustration of how and where the additional developments can be accommodated, and form the basis for drawing up the design plans, weighing up the different interests with regard to the protected buildings, and conducting future architectural competitions

www.ethz.ch/buildings  $\rightarrow$ 

# Award-winning achievements

Researchers at ETH Zurich again received numerous prizes and honours for their outstanding scientific work in 2014. These awards make it clear just how committed the ETH Zurich scientists are to their work and how they contribute to the university's international reputation.

But the fact that the researchers work together so successfully also stems from the inspiring environment ETH Zurich offers them. An open, international work environment, top-quality infrastructure and considerable freedom in their research and teaching provide faculty and staff with the ideal conditions for outstanding achievements. ETH Zurich does everything in its power to reinforce these success factors. These qualities are also precisely what enables ETH Zurich to continue to attract talented young researchers as new professors, thus laying the foundations in terms of staff for future research successes.

Donations that ETH Zurich receives from the private sector also contribute to the positive environment. Generous donations from companies, foundations, institutions and private individuals enable the university to open up promising new areas of research at an early stage and thus secure its leading position among the world's universities.

The fact that Switzerland was able to agree with the EU on a partial association with the important research programme Horizon 2020 is vital for ETH Zurich's international positioning. This guarantees that ETH researchers will continue to be able to take part in calls for proposals by the European Research Council (ERC). In recent years, scientists at ETH Zurich have been awarded 46 Advanced Grants and 35 Starting and Consolidator Grants, making it one of the most successful universities in Europe in this respect.



Leading higher education institutions, as of 26.5.2014

Institute of Atmospheric and Climate Science, received an ERC Consolidator Grant in the excellent research projects. She investigates the impact of soil moisture and vegetation on the dynamics of heat waves and droughts. Thomson Reuters named Seneviratne as one in 2014.





Professor Peter J. Bickel (left) and Professor Nick McKeown (right), recipients of honorary doctorates, with ETH Rector Lino Guzzella.

# Honorary doctorates from ETH Zurich

ETH Zurich awards honorary doctorates to acknowledge recipients' extraordinary scientific and scholarly work. It honours their significant achievements in science, teaching and practice, or in the synthesis of research and practical work.

At ETH Day 2014, the rector of ETH Zurich awarded honorary doctorates to the following recipients:

### Prof. Dr. Peter J. Bickel

for his outstanding contributions to various fields of statistics, and for his pioneering influence on mathematical statistics and its applications.

### Prof. Dr. Nick McKeown

for his pioneering work in the field of computer networks, especially for his contributions to the architecture of internet routers and of software-defined networking as a highly promising approach to the internet of the future.

# Honours and prizes given to members of ETH

### A

Prof. Dr. Rudolf Aebersold, D-BIOL, Member of the National Academy of Sciences Leopoldina, Germany

Prof. Dr. Karl-Heinz Altmann, D-CHAB, Paul Ehrlich Prize. The French Medicinal Chemistry Society, France

Prof. Dr. Göran Andersson, D-ITET, Felix Wu Distinguished Lecture in Power Systems, University of Hong Kong, Hong Kong

### В

Prof. Dr. Paul Biran, D-MATH, Member of the National Academy of Sciences Leopoldina, Germany

Information Theory Society Distinguished Lecturer, Institute of Electrical and Electronics Engineers, USA

Prof. Dr. Sebastian Bonhoeffer, D-USYS, Member of the European Molecular Biology

Prof. Dr. Karsten M. Borgwardt, D-BSSE, SNSF Starting Grant, Swiss National Science Foundation, Switzerland

Prof. Dr. Lucas Bretschger, D-MTEC, elected President of the European Association of Environmental and Resource Economists, Italy

Distinguished Lecturer at the Chinese Academy of Sciences, China

### С

Prof. Dr. Erick M. Carreira, D-CHAB, Probst Lecture, University of Illinois, USA; Yamada Koga Prize, Japanese Chemical Society, Japan;

Schulich Faculty Colloquium, Technion Institute of Technology, Israel;

Len Owen Lecture, Hofmann Symposium, Imperial College London, United Kingdom Prof. Dr. Constance Ciaudo, D-BIOL, Young Investigator Award, Federation of European Biochemical Societies, Spain

Prof. Dr. Christophe Copéret, D-CHAB, International Organic Chemistry Foundation Yoshida Lectureship Award, Kyoto University, Janan.

Meloche Lectureship, University of Wisconsin-Madison, USA: P.H. Emmett North American Catalysis Society Award, North American Catalysis Society, USA

### D

ster, Germany;

Munich. Germany:

Luxembourg

Е

lands

Prof. Dr. Helmut Bölcskei, D-ITET, IEEE

Organisation, Germany

Prof. Dr. Peter L. Bühlmann, D-MATH,

### Fellow of the Royal Society, for revolutionising studies of Earth's carbon cycle, Royal Society of London, United Kingdom

Prof. Dr. Paul Embrechts, D-MATH, Visiting Man Chair, Oxford-Man Institute, Oxford University, United Kingdom; Fellow of the American Statistical

Association, USA

Prof. Tom Emerson, D-ARCH, RIBA and RIBA Special London Award, London. United Kingdom

Prof. Dr. Tilman Esslinger, D-PHYS, elected Fellow of the American Physical Society, USA

PD Dr. Eling de Bruin, D-HEST, Associate Professor, University of Maastricht, Nether-

Prof. Dr. Francois Diederich, D-CHAB, Ernst Hellmut Vits Prize, University Society, Mün-

Bohlmann Lecture, TU Berlin, Germany; Römer Lecture, Ludwig Maximilian University,

Prix Paul METZ, Grand Ducal Institute,

Prof. Dr. Silvia Dorn, D-USYS, C.V. Riley Lecture, C.V. Riley Entomological Society, University of Missouri, USA; Doron Prize 2014, Swiss Foundation for the Doron Prize, Switzerland; Excellent research achievements,

Entomological Society of America, USA

Prof. Dr. Timothy Ian Eglinton, D-ERDW,

### E

Prof. Dr. Andreas Fichtner, D-ERDW, Early Career Scientist Award, International Union of Geodesy and Geophysics, Germany

Prof. Dr. Gerd Folkers, D-CHAB, honorary member of the Swiss pharmacists' association pharmaSuisse, Switzerland; Reichstein Medal, Swiss Academy of Pharmaceutical Sciences, Switzerland

Prof. Dr. Klaus Fröhlich, D-ITET, member of the Swiss Academy of Engineering Sciences, Switzerland

### G

Prof. Fabio Gramazio, D-ARCH, Pioneering Achievement Award, Rob|Arch, USA

Prof. Dr. Hansiörg Grützmacher. D-CHAB. Member of the Board for Applied Chemistry, Association of German Chemists, Germany

Prof. Dr. Detlef Günther, D-CHAB, Member of the National Academy of Sciences Leopoldina, Germany

Prof. Dr. Lino Guzzella, D-MAVT, Watt d'Or 2014, Swiss Federal Office of Energy, Switzerland

### H

Prof. Dr. Michael Hagner, D-GESS, Martin Warnke Medal and Prize of the University of Hamburg and the Aby Warburg Foundation, Germany

Prof. Dr. Irena Hainsek. D-BAUG. Fellow. Institute of Electrical and Electronics Engineers, USA

Prof. Dr. Dirk Helbing, D-GESS, honorary doctorate from TU Delft, Netherlands

Prof. Dr. Ari Helenius, D-BIOL, Harry Burr Ferris Lecture, Yale School of Medicine, USA; Silver Medal, University of Helsinki, Finland

Prof. Dr. Donald Hilvert, D-CHAB, European Biophysical Societies' Association Lecture, VU University Amsterdam, Netherlands: Novartis Lecture, Boston College, USA

Prof. Dr. Jonathan Home, D-PHYS, SNSF Consolidator Grant, Swiss National Science Foundation, Switzerland

### J

Prof. Dr. Gunnar Jeschke, D-CHAB, Zavoisky Award, Zavoisky Physical-Technical Institute in Kazan, Russian Federation

### Κ

Prof. Matthias Kohler, D-ARCH, Pioneering Achievement Award, Rob|Arch, USA

Prof. Dr. Johann Walter Kolar. D-ITET. R. David Middlebrook Award, Institute of Electrical and Electronics Engineers, USA; Semikron Innovation Award, Semikron Foundation. Germany

Prof. Dr. Ulrike Kutay, D-BIOL, elected Member of Academia Europaea, United Kingdom

### L

Prof. Dr. Jean-Christophe Leroux, D-CHAB, APV Research Award for Outstanding Achievements in Pharmaceutical Sciences, Association for Pharmaceutical Process Technology, Germany:

Election to the College of Fellows, Controlled Release Society, USA

Prof. Dr. Simon Lilly, D-PHYS, Fellow of The Royal Society, United Kingdom

Prof. Dr. Ulrike Lohmann, D-USYS, Jule Charney Lecture, AGU Atmospheric Sciences, USA:

Member of the National Academy of Sciences Leopoldina, Germany

### Μ

Prof. Dr. Joao Matos, D-BIOL, SNSF Starting Grant, Swiss National Science Foundation, Switzerland

### David Alexander May, D-ERDW, elected Member of the Scientific Steering Committee, Computational Infrastructure for Geodynamics, USA

Prof. Dr. Marco Mazzotti, D-MAVT, honorary doctorate in engineering (Dr. Ing. E.h.), Otto-von-Guericke University, Magdeburg, Germany

Dr. Lynne Bridget McCusker, D-MATL, PhD honoris causa, Stockholm University, Sweden

Prof. Dr. Beat H. Meier, D-CHAB, Laukien Prize, ENC, USA

Prof. Dr. Frédéric Merkt, D-CHAB, Otto Bayer Prize, Bayer Science & Education Foundation, Germany

Prof. Dr. Bertrand Meyer, D-INFK, honorary doctorate, University of York, United Kingdom; IFIP Silver Core Award, International Federation for Information Processing, Austria

Prof. Dr. Manfred Morari, D-ITET, subject of special issue of Computers & Chemical Engineering, USA; Distinguished Faculty Lectureship,

University of Texas, USA;

Distinguished Lecture Series,

USA:

Germanv

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Germany

University of Connecticut, USA; Invited talk in honour of Prof. Ignacio Grossmann's contributions, AIChE, USA;

The Paynter Lecture in Controls, MIT, USA

Prof. Dr. Massimo Morbidelli, D-CHAB,

Gerhard Damköhler Medal, ProcessNet,

### The Alwin Schaller Distinguished Lecture, University of Illinois at Urbana-Champaign,

a Corresponding Member of the Academy of Sciences at Göttingen, Germany;

of Natural Sciences, Leopoldina, Germany

Prof. Dr. Jennifer Rupp, D-MATL, SNSF Starting Grant, Swiss National Science Foundation. Switzerland:

Top Young Scientist under the age of 40 at the World Economic Forum China 2014, China

### <u>S</u>

Prof. Dr. Uwe Sauer, D-BIOL, Technology and Development Project, SystemsX.ch, Swiss National Science Foundation. Switzerland

Prof. Dr. Gisbert Schneider, D-CHAB, Fellow of the University of Tokyo, Japan

Dr. Ingo Scholtes, D-MTEC, GI Junior Fellow, German Informatics Society, Germany

Prof. Dr. Roland Siegwart, D-MAVT, IEEE RAS Inaba Technical Award for Innovation Leading to Production, Institute of Electrical and Electronics Engineers, USA

Prof. Dr. Ruth Signorell, D-CHAB, Fellow of the Royal Society of Chemistry, United Kingdom;

Adjunct Professorship, University of British Columbia, Vancouver, Canada

Prof. Dr. Johan Six, D-USYS, Philippe Duchaufour Medal of the European Geosciences Union. Austria

Prof. Dr. Mete Soner, D-MATH, Humboldt Research Prize, Alexander von Humboldt Foundation. Germany

Prof. Dr. Sarah M. Springman, D-BAUG, The Seymour Whyte Distinguished Lecture for Women in Civil Engineering, The University of Queensland, Australia

Prof. Dr. Aldo Steinfeld, D-MAVT, elected to the Scientific Council, Scientific Intentional Center of Heat and Mass Transfer, USA

Prof. Dr. med. Klaas Enno Stephan, D-ITET, elected as a Scientific Member of the Max Planck Society and as an External Scientific Member of the Max Planck Institute for Metabolism Research, Germany

Prof. Dr. Elsbeth Stern, D-GESS, Member of the Academy of Sciences and Literature, Germany

Prof. Dr. Michael Strasser. D-ERDW. IAS Young Scientist Award, International Association of Sedimentologists, Belgium

Prof. Dr. André R. Studart, D-MATL, SNSF Consolidator Grant, Swiss National Science Foundation, Switzerland: Joliot Chair, ESPCI ParisTech, France

Prof. Dr. Alain-Sol Sznitman, D-MATH, Member of the IMU Circle, International Mathematical Union, Germany

Prof. Dr. Josef Teichmann, D-MATH, Louis Bachelier Prize, French Academy of Sciences France

U

Ι

Prof. Dr. Peter Uggowitzer, D-MATL, Tammann Commemorative Medal, German Society for Materials Science, Germany

Prof. Dr. Sara van de Geer, D-MATH, Kloosterman Chair, University of Leiden, Netherlands; P.C. Manaholobis Memorial Lecturer, Indian Statistical Institute India

Prof. Dr. Viola Vogel, D-HEST, jury member of the Queen Elizabeth Prize for Engineering, United Kingdom

Prof. Dr. Olivier Voinnet, D-BIOL, Member of the French Academy of Sciences, France

### W

Prof. Dr. Emo Welzl. D-INFK, elected to the Austrian Academy of Sciences, Austria

Prof. Dr. Helma Wennemers, D-CHAB, EurJOC Lectureship, European Journal of Organic Chemistry, Germany

Prof. Dr. Erich J. Windhab, D-HEST, Fellow of the International Academy of Food Science and Technology (IAFoST), USA; International Food Engineering Award, American Society of Agricultural and Biological Engineers, USA

Prof. Dr. Hans Jakob Wörner, D-CHAB, Klung Wilhelmy Wissenschafts Prize. Freie Universität Berlin, Germany

Prof. Dr. Alexander Wokaun, D-CHAB, Wilhelm Jost Memorial Lecture, Academy of Sciences at Göttingen, Germany

Prof. Dr. Christian Wolfrum, D-HEST, Rössler Prize, ETH Zurich, Switzerland

Prof. Dr. Vanessa Wood, D-ITET, Science Award Electrochemistry, Volkswagen AG and BASF, Germany

Geological Society of America, USA

Prof. Dr. Felicitas Pauss. D-PHYS. Lise Meitner Lecturer of the German and Austrian Physical Society, Germany/Austria; Honorary doctorate, Technical University Vienna, Austria

Prof. Dr. Christopher Onder, D-MAVT,

Prof. Dr. Dani Or, D-USYS, Fellow of the

Watt d'Or 2014, Swiss Federal Office of Energy,

Prof. Dr. Javier Pérez-Ramírez, D-CHAB, Beilby Medal and Prize, the Royal Society of Chemistry and the Institute of Materials, Minerals and Mining, United Kingdom

Prof. Dr. Dimos Poulikakos, D-MAVT, Distinguished Professor without Borders, Brazilian government, Brazil

Prof. Dr. Alexander Puzrin, D-BAUG, Fellow of the Institution of Civil Engineers, United Kingdom;

Honorary Editor and Chairman of the Géotechnique Advisory Panel, UK Institution of Civil Engineers, United Kingdom

### Q

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Switzerland

Prof. Dr. Martin Quack, D-CHAB, elected as

Elected as a member of the German Academy

### Dr. Cristina Müller, D-CHAB, Ružička Prize, R

Prof. Dr. Ryan O. Murphy, D-GESS, Anatol Rapoport Prize, German Society

# for Sociology, Germany

Prof. Dr. Bradley Nelson, D-MAVT,

Prof. Dr. Peter Niemz, D-BAUG,

Fellow of the 3M-NANO Society, China

Wilhelm Klauditz Medal. International Associ-

ation for Technical Issues Related to Wood,

Dr. Tobias Nüesch, D-MAVT, Watt d'Or 2014. Swiss Federal Office of Energy, Switzerland

ETH Zurich, Switzerland

### Ζ

Prof. Dr. Renato Zenobi, D-CHAB, Thomson Medal, International Mass Spectrometry Foundation. Netherlands

Florian Zurbriggen, D-MAVT, Watt d'Or 2014, Swiss Federal Office of Energy, Switzerland

For abbreviations of departments, see www.ethz.ch/departments  $\rightarrow$ 

The ERC Advanced Grants (2014 round) were awarded after the publication of this annual report.

## New Professors

### Full Professors

### New appointments

**Prof. Dr. Gabriel Aeppli,** for Physics (1.4.2014), D-PHYS, formerly Director of the London Centre for Nanotechnology and Quain Professor of Physics at University College London, United Kingdom

**Prof. Tom Emerson,** for Architecture and Construction (1.8.2014), D-ARCH, formerly Assistant Professor of Architecture and Design at ETH Zurich

**Prof. Dr. Thomas Hofmann,** for Data Analytics (1.4.2014), D-INFK, formerly Director of Engineering at Google Inc., Zurich, and Lecturer and Titular Associate Professor at ETH Zurich

**Prof. Dr. Walter Kaufmann,** for Structural Engineering (1.5.2014), D-BAUG, formerly Chairman of the Executive Board of dsp Ingenieure & Planer AG, Greifensee

**Prof. Dr. Sebastian Kozerke,** for Biomedical Imaging (1.10.2014), D-ITET, formerly Professor of Biomedical Imaging at the University of Zurich

**Prof. Dr. Arno Schlüter,** for Architecture and Building Systems (1.6.2014), D-ARCH, formerly Assistant Professor of Architecture & Sustainable Building Technologies at ETH Zurich

**Prof. Dr. Jan Vermant,** for Soft Materials (1.8.2014), D-MATL, formerly Professor of Chemical Engineering and Head of the Department of Chemical Engineering at KU Leuven, Belgium

**Prof. Dr. Mehmet Fatih Yanik,** for Neurotechnology (1.7.2014), D-ITET, formerly Associate Professor of Electrical Engineering at the Massachusetts Institute of Technology, Cambridge, USA

### Promotions

**Prof. Christian Kerez,** for Architecture and Design (1.10.2014), D-ARCH, formerly Associate Professor in the same subject area

**Prof. Dr. Klaus Kirch,** for Particle Physics (1.1.2014), D-PHYS, formerly Associate Professor in the same subject area

**Prof. Dr. Ralph Spolenak,** for Nanometallurgy (1.10.2014), D-MATL, formerly Associate Professor in the same subject area

**Prof. Dr. Wendelin J. Stark,** for Functional Materials Engineering (1.10.2014), D-CHAB, formerly Associate Professor in the same subject area

### Associate Professors

(New appointments)

**Prof. Dr. Philippe Block,** for Architecture and Structure (1.10.2014), D-ARCH, formerly Assistant Professor (tenure-track) of Building Structure at ETH Zurich

**Prof. Dr. Karsten M. Borgwardt,** for Data Mining (1.6.2014), D-BSSE, formerly Professor of Data Mining in the Life Sciences at Eberhard Karls University and Research Group Leader at the Max Planck Institute for Intelligent Systems, Tübingen, Germany

**Prof. Dr. Petra S. Dittrich,** for Bioanalytics (1.10.2014), D-BSSE, formerly Assistant Professor (tenure-track) of Bioanalytics at ETH Zurich

**Prof. Dr. Roger Gassert,** for Rehabilitation Engineering (1.10.2014), D-HEST, formerly Assistant Professor of Rehabilitation Engineering at ETH Zurich

**Prof. Dr. Isabel Günther,** for Development Economics (1.6.2014), D-GESS, formerly Assistant Professor (tenure-track) of Development Economics at ETH Zurich

### Prof. Dr. Cornelia Halin Winter, for

Pharmaceutical Immunology (1.10.2014), D-CHAB, formerly Assistant Professor of Drug Discovery Technologies at ETH Zurich

**Prof. Dr. Dagmar Iber,** for Computational Biology (1.10.2014), D-BSSE, formerly Assistant Professor (tenure-track) of Computational Biology at ETH Zurich

**Prof. Dr. André R. Studart,** for Complex Materials (1.4.2014), D-MATL, formerly Assistant Professor (tenure-track) of Complex Materials at ETH Zurich

### Assistant Professors

(New appointments)

### Prof. Dr. Otto Xavier Cordero Sanchez,

for Microbial Population Biology (1.2.2014), D-USYS, formerly a postdoctoral researcher at the Massachusetts Institute of Technology, Cambridge, USA

**Prof. Dr. Florian Dörfler,** for Complex Systems Control (1.7.2014), D-ITET, formerly Assistant Professor at the University of California, Los Angeles, USA

**Prof. Dr. Orçun Göksel,** for Computer-Assisted Applications in Medicine (1.8.2014), D-ITET, formerly a postdoctoral researcher at ETH Zurich

**Prof. Dr. Peter Simon Jossen,** for Mathematics (1.9.2014), D-MATH, formerly a postdoctoral researcher at EPF Lausanne

**Prof. Dr. Walter Karlen,** for Mobile Health Systems (1.10.2014), D-HEST, formerly a postdoctoral fellow at the University of British Columbia, Vancouver, Canada

**Prof. Dr. Antti Knowles,** for Mathematics (1.1.2014), D-MATH, formerly Assistant Professor at the Courant Institute of Mathematical Sciences of New York University, USA **Prof. Dr. Volodymyr Korkhov,** for Membrane Proteins and Signal Transduction (1.4.2014), D-BIOL, formerly a postdoctoral researcher at ETH Zurich

**Prof. Dr. Martin Larsson,** for Mathematical Finance (1.9.2014), D-MATH, formerly a postdoctoral student at EPF Lausanne

**Prof. Dr. Mark Lever,** for Environmental Microbiology (1.8.2014), D-USYS, formerly a postdoctoral researcher at Aarhus University, Denmark

**Prof. Dr. Joao Matos,** for Cellular Biochemistry (1.1.2014), D-BIOL, formerly a postdoctoral research associate at the London Research Institute, United Kingdom

**Prof. Dr. Paul D. Nelson,** for Mathematics (1.8.2014), D-MATH, formerly a postdoctoral researcher at EPF Lausanne

**Prof. Dr. Nicolas Noiray,** for Energy Technology (1.8.2014), D-MAVT, formerly an engineer in research and development at Alstom Power, Baden

**Prof. Dr. Martin Pilhofer,** for Cell Biology (1.2.2014), D-BIOL, formerly a research associate at the California Institute of Technology, Pasadena, and the Howard Hughes Medical Institute, Chevy Chase, USA

**Prof. Dr. Sereina Riniker,** for Computer-Aided Chemistry (1.6.2014), D-CHAB, formerly a postdoctoral researcher at the Novartis Institutes for BioMedical Research, Basel

**Prof. Dr. Antia Rodriguez-Villalon,** for Plant Development Biology (1.11.2014), D-BIOL, formerly a postdoctoral researcher at the University of Lausanne

**Prof. Dr. Gerald Schwank,** for Stem Cell and Disease Modelling (1.10.2014), D-BIOL, formerly a postdoctoral researcher at the Hubrecht Institute, Utrecht, Netherlands

**Prof. Dr. Tanja Stadler,** for Computational Evolution (1.1.2014), D-BSSE, formerly Group Leader at the Institute for Integrative Biology at ETH Zurich **Prof. Dr. Christoph Stadtfeld,** for Social Networks (1.9.2014), D-GESS, formerly a postdoctoral researcher at the Universities of Groningen, Netherlands, and Lugano

**Prof. Dr. Evelina Viada,** for Mathematics (1.11.2014), D-MATH, formerly Assistant Professor at the University of Basel

### Adjunct Professors

employed as Lecturer
Prof. Dr. Francesca Da Lio,

and Lecturer

**Prof. Dr. Peter Alfons Fischer,** D-HEST, employed as Senior Scientist and Lecturer

**Prof. Dr. Jörg Goldhahn,** D-HEST, employed as Senior Lecturer

**Prof. Dr. Christopher Onder,** D-MAVT, employed as Senior Scientist and Lecturer

**Prof. Dr. Bernd Wollscheid,** D-HEST, employed as Senior Scientist and Lecturer

**Prof. Dr. Niklaus Zimmermann,** D-USYS, employed as Lecturer

For abbreviations of departments, see www.ethz.ch/departments  $\rightarrow$ 

Prof. Dr. Markus Ammann, D-USYS,

**Prof. Dr. Francesca Da Lio,** D-MATH, employed as Senior Scientist

## Donations

Many companies, foundations, organisations and private individuals wish to work with ETH Zurich to strengthen education and research and thereby make an effective contribution to supporting Switzerland as a centre for business and ensuring its competitiveness worldwide. On behalf of its researchers and students, ETH Zurich would like to thank all its donors for their contributions and for their confidence in the university.

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### The ETH Zurich Foundation

The ETH Zurich Foundation is an independent, private and non-profit foundation with the mission of promoting teaching and research at ETH Zurich. Through its activities, the ETH Zurich Foundation supports ETH Zurich in maintaining and developing its leading position among the world's top universities. Federal funding is usefully supplemented by private financing.

www.ethz-foundation.ch  $\rightarrow$ 

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### Alumni and private individuals

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Fred Kindle Dr. Paul Kleiner Prof. Dr. Leonhard Kleiser Prof. Hans-Jürgen Lang Heinrich M. Lanz Prof. Dr. Peter Leuthold Dr. Shu-Kun Lin Robert Mathys Gérard Messmer Patrick Müller Dr. Felix Nohl Kurt Nohl Frederick Oederlin Dr. Markus Rauh Prof. Dr. Alfred Rösli Dr. Max Rössler Dr. Urs Saner Peter Scartazzini Gerhard E. Schmid Prof. Dr. Gerhard Schweitzer Prof. Dr. Roland Siegwart Dr. Christian Sigg Dr. Konstantin u. Maria Skaleric Dr. Alfred Spälti Th. und C. Spaltenstein Peter Spoerri Dr. Rudolf K. Sprüngli Prof. Dr. Rudolf Starkermann Dr. Reinhold O. Steiner Rudolf Stüssi-Hodel Dr. Johann Sutter Peter Trauffer Dr. Lucien und Joshiko Trueb Dr. Hans Tschamper Regula und Dr. Alex Vannod-Nussbaum Ruedi Wassmer Dr. Nicolaus-Jürgen und Dr. Christiane Weickart Adrian Urs Weiss Branco Weiss Peter J. Wild Maximilian Winkler Prof. Dr. Alexander Wokaun Prof. Dr. Heidi und Dr. Werner Wunderli-Allenspach Dr.h.c. mult. Hansjörg Wyss Christine Wyttenbach Rolf Zobrist Walter Zumstein

This list shows donors to the ETH Zurich Foundation and ETH transfer, in accordance with the ETH Zurich Code of Conduct of 2 September 2014 setting out how to handle donations. We are also grateful to all those donors who are not mentioned by name.



Professor Gassert's knee perturbator examines the healthy knee joint while walking to develop better prosthetic devices.

## **Donors fast-track** health research

Medical research needs more young professionals and a new spirit of invention. That's why, with the help of the ETH Zurich Foundation, many donors get involved in the strategic fields of medical technology and personalised medicine at ETH Zurich.

Thanks to a generous donation from the Wilhelm Schulthess Foundation, ETH Zurich has been able to set up the Chair of Physical Activity and Health to promote research into the impact of physical activity on human physiology and long-term wellbeina

Another chair, in the field of rehabilitation technology, has been made possible by the Zurich based company Hocoma. The chair focuses on interaction between humans and robots and on sensor-based equipment for movement therapy.

Finally, 2014 saw the founding of the Wyss Translational Center Zurich, a research centre situated at the interface of medical research, the natural sciences and engineering. A donation to the ETH Zurich Foundation by Dr.h.c.mult. Hansjörg Wyss made it possible for ETH Zurich and the University of Zurich to set up the centre, which will further strengthen Zurich's position as a leading hub of university medicine.

# Steady growth

The growth trend at ETH Zurich continued unabated in 2014. At the end of 2014, some 18,500 women and men were enrolled at ETH Zurich, a higher number than ever before. Another encouraging development is that the numbers of visiting and exchange students fell only slightly, despite the fact that Switzerland can no longer take part in the Erasmus+ programme and student exchanges are now organised under the Swiss-European Mobility Programme.

With 426 new entrants, the Mechanical Engineering degree programme remains particularly popular among new students. One trend in the engineering programmes is very pleasing in light of Switzerland's skills shortage: the number of new Bachelor's students in this subject area has increased by 51 percent over the last ten years.

The key financial figures also reflect the growth trend at ETH Zurich. The university's overall expenditure came to 1,556 million Swiss francs in 2014, an increase of 2.9 percent in comparison with the previous year. Third-party funding is vital to the university's financial position, and ETH Zurich has been very successful in this area, too: between 2006 and 2014, contributions from EU projects almost trebled and funding from national organisations was up by nearly 100 percent.



**NEW BACHELOR'S DEGREE STUDENTS** By faculty, 2005–2014

# **Development of ETH Zurich**

ETH Zurich enrolled 6,774 new students in 2014, an increase of 159 percent compared to new entries in 2000. The total number of students at ETH rose to 18,616 - 74 percent more than in 2000.

### Students

	2000	2010	2011	2012	2013	2014
New enrolments <sup>1</sup> (details from page 42)	2,614	6,081	6,333	6,305	6,529	6,774
Percentage women	28.0 %	31.8 %	31.7%	31.8%	31.8%	31.3%
Percentage international students	26.1%	39.8 %	40.1%	41.2%	40.0%	39.9%
Bachelor's students	0	2,450	2,562	2,549	2,651	2,657
Master's students	0	1,860	1,904	1,919	2,029	2,311
Diploma students	1,717	0	0	0	0	0
Visiting/exchange students	98	474	492	535	575	522
Doctoral students	613	957	1,035	993	1,000	1,006
MAS/MBA students	186	340	340	309	274	278
Students, headcount <sup>1</sup> (details from page 43)	10,693	16,343	17,187	17,781	18,178	18,616
Percentage women	25.1%	30.9%	30.8 %	30.6 %	30.6 %	30.6 %
Percentage international students	20.3 %	34.9%	36.1%	36.9%	37.1%	37.3%
Total registrations <sup>2</sup>	10,779	17,172	17,887	18,375	18,743	19,175
Bachelor's students	0	8,101	8,439	8,587	8,862	8,938
of which with foreign entry qualification <sup>3</sup>	0	13.7%	14.4 %	14.3%	14.2%	14.1%
Master's students	0	4,235	4,563	4,702	4,778	5,159
of which with foreign entry qualification <sup>3</sup>	0	33.2 %	34.2%	35.2%	35.4 %	35.7%
Diploma students	8,130	220	1	0	0	0
Visiting/exchange students	83	322	362	385	407	346
Doctoral students	2,262	3,521	3,699	3,807	3,894	3,976
MAS/MBA students	304	773	823	894	802	756
Student-faculty ratio (HC per FTE)	32.1	39.6	40.1	39.6	39.0	39.9
Graduations <sup>1</sup> (details from page 45)	1,890	3,382	3,709	4,028	4,101	4,392
Percentage women	25.1%	31.2 %	31.4%	32.3 %	30.5%	31.1%
Bachelor's degrees	0	1,283	1,304	1,447	1,447	1,579
Master's degrees	0	1,257	1,506	1,650	1,847	1,839
Diplomas	1,191	18	0	0	0	0
Doctorates	523	650	696	747	579	769
Diplomas for continuing education programmes	176	174	203	184	228	205
Personnel (details from page 47)						
	2000	2010	2011	2012	2013	2014
Staff, headcount	7,453	9,809	10,040	10,242	10,478	10,851
of which professors, headcount <sup>4</sup>	351	446	462	482	497	498
Total full-time equivalents	5,464	7,284	7,501	7,662	7,914	8,1435
Percentage women	26.4 %	30.7%	31.2%	31.1%	31.6 %	31.1%
Professors	333	413	428	449	466	467
Scientific staff	3,390	4,479	4,644	4,753	4,925	5,065
Technical, IT and administrative staff	1,624	2,241	2,276	2,293	2,357	2,437
Apprentices	117	150	153	167	166	174
Finances (details from page 49)						
	2000	2010	2011	2012	2013	2014
Expenditure (in million CHF)	1,058.9	1,359.3	1,454.8	1,466.8	1,512.3	1,556.2
Federal financial contribution (in million CHF)	914.96	1,081.87	1,101.3 <b>7</b>	1,101.0	1,146.8	1,210.3
Third-party resources (in million CHF)	144.0	277.4	353.5	365.8	365.6	345.9

1 Excludes physical education and sports teacher as well as professional officer training. As a result of the revision of the Regulations for Doctoral Studies, the date for deregistration was changed from Dece to January, so the number of graduates in 2013 was reduced. 2 Since students can register for more than one programme, the number of enrolments is higher than the headcount. 3 Foreign-educated students: people of non-Swiss nationality who lived abroad before commencing their studies, i.e. those students who came to Switzerland expressly for the purpose of studying. 4 Includes professors employed at another institution. 5 A new regulation regarding scientific staff went into effect at ETH Zurich on 1 January 2015. It generally requires all doctoral students to be employed full-time. This change will be reflected in the 2015 reporting as an increase of 647 FTEs over the 2014 figure (2014: 8,790 FTEs, of which 5,711 FTEs are scientific staff). 6 Federal financial contribution in 2000: incl. funding from other federal agencies amounting to 4.1 million francs. 7 Federal financial contribution in 2010/2011: implementing the HPCN strategy/the new CSCS building was pre-financed with 12.4 million francs in the year 2010. This advance funding was used in 2011.

# New students

	Total		Bachelo student	er's s	Master's student	s s	Visiting, change	/ex- students	Doctora student	l s	MAS/ME student	BA s <sup>1</sup>
	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
ETH Zurich total (registrations)	6,529	6,774	2,651	2,657	2,029	2,311	575	522	1,000	1,006	274	278
Percentage women	31.8%	31.3%	30.2 %	29.8%	31.4%	30.8%	33.2%	34.5%	34.1%	31.8%	39.4%	42.1%
Percentage international students	40.0%	39.9%	18.9%	19.9%	36.1%	37.6%	96.2%	92.9%	70.8%	70.3%	43.8%	41.7%

### Programmes

	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
Architecture and Building Sciences	1,220	1,239	524	481	381	494	127	106	102	97	86	61
Architecture	590	663	258	245	185	269	64	65	30	31	53	53
Civil Engineering	344	347	170	167	97	113	31	22	46	45	-	-
Environmental Engineering	186	168	76	58	62	77	25	15	14	10	9	8
Geomatic Engineering and Planning	100	61	20	11	37	35	7	4	12	11	24	0
Engineering Sciences	2,130	2,240	897	934	705	783	214	207	313	314	1	2
Mechanical Engineering	886	890	465	426	268	285	56	57	97	122	-	-
Electrical Engineering and Information Technology	438	490	167	203	106	127	74	60	91	100	-	-
Biosciences and Engineering	127	128	6	3	74	86	12	18	35	21	-	-
Interdisciplinary Engineering Sciences	103	122	-	-	103	122	-	-	-	-	-	-
Computer Science	432	477	208	235	122	137	53	56	48	47	1	2
Materials Science	144	133	51	67	32	26	19	16	42	24	-	-
Natural Sciences and Mathematics	1,716	1,807	715	726	539	575	121	118	297	306	44	82
Mathematics	340	335	133	133	131	130	30	30	34	28	12	14
Computational Science and Engineering	40	57	18	22	19	27	1	4	2	4	-	-
Physics	419	445	196	182	120	139	29	22	65	65	9	37
Chemistry	251	260	67	73	44	48	38	40	91	87	11	12
Chemical Engineering	79	62	37	24	29	22	-	-	13	16	-	-
Interdisciplinary Sciences	86	100	61	71	22	27	-	-	3	2	-	-
Pharmaceutical Sciences	173	207	76	107	74	77	7	5	16	18	-	-
Biology	328	341	127	114	100	105	16	17	73	86	12	19
System-oriented Natural Sciences	1,136	1,123	501	502	307	345	69	49	214	208	45	19
Earth Sciences	172	171	36	32	71	94	15	9	46	31	4	5
Environmental Sciences	288	292	114	97	85	95	15	13	74	87	-	-
Agricultural Sciences	124	127	59	58	28	38	7	4	30	27	-	-
Health Sciences and Technology	393	357	220	218	75	70	15	17	53	43	30	9
Food Sciences	159	176	72	97	48	48	17	6	11	20	11	5
Management and Social Sciences	327	365	14	14	97	114	44	42	74	81	98	114
Management, Technology and Economics	239	248	-	-	60	69	42	41	53	51	84	87
Humanities, Social and Political Sciences	88	117	14	14	37	45	2	1	21	30	14	27

1 Students taking the teaching diploma for grammar schools are shown in the MAS/MBA students category. These programmes certify graduation from a teacher training course.

# Students

Students can enrol on more than one course at the same time. This is why the number of enrolments is higher than the number of people (headcount). For the purposes of the headcount, students are only counted on their main course (e.g. as Master's students if they have enrolled on both Bachelor's and Master's courses).

	Total		Bachelo student	or's s	Master' student	s s	Visiting, change	/ex- students	Doctora student	l s	MAS/MI student	BA s <sup>1</sup>
	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
ETH Zurich total (headcount)	18,178	18,616	8,444	8,502	4,778	5,159	406	346	3,889	3,975	661	634
Percentage women	30.6 %	30.6 %	30.0%	29.7%	30.3%	30.6 %	31.8%	32.9%	30.9%	31.3 %	37.7%	37.9%
Percentage international students	37.1%	37.3%	19.4%	20.0%	38.2%	38.4 %	93.3%	90.2%	68.3%	68.6 %	37.8%	36.3%
Total registrations	18,743	19,175	8,862	8,938	4,778	5,159	407	346	3,894	3,976	802	756

### Programmes

2013	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
3,635	3,599	1,927	1,820	1,010	1,122	103	78	465	462	130	117
1,876	1,839	1,021	951	550	597	55	48	160	164	90	79
1,013	1,044	585	587	209	250	22	15	197	192	-	-
507	496	250	225	162	186	22	11	59	57	14	17
239	220	71	57	89	89	4	4	49	49	26	21
6,128	6,390	3,020	3,165	1,710	1,803	140	131	1,241	1,275	17	16
2,700	2,750	1,632	1,628	636	680	33	31	399	411	-	-
1,294	1,367	578	635	281	294	48	37	387	401	-	-
319	323	16	16	187	182	6	9	110	116	-	-
258	287	0	0	258	287	-	-	-	-	-	-
1,174	1,258	627	698	271	288	42	40	217	216	17	16
383	405	167	188	77	72	11	14	128	131	-	-
4,874	4,930	2,228	2,211	1,107	1,182	91	82	1,224	1,226	224	229
869	847	385	372	304	290	21	20	122	123	37	42
137	159	88	97	41	53	1	2	7	7	-	-
1,152	1,204	545	553	236	273	21	16	276	285	74	77
712	714	210	207	94	97	32	28	334	341	42	41
212	207	105	90	45	55	-	-	62	62	-	-
248	264	188	199	50	55	-	-	10	10	-	-
530	532	315	306	132	146	4	5	79	75	-	-
1,014	1,003	392	387	205	213	12	11	334	323	71	69
3,278	3,375	1,649	1,701	684	743	40	27	727	759	178	145
488	485	152	145	166	180	7	6	148	142	15	12
938	946	429	404	231	244	10	7	268	291	-	-
340	353	204	199	55	70	5	2	76	82	-	-
1,025	1,087	595	655	129	138	8	9	152	170	141	115
487	504	269	298	103	111	10	3	83	74	22	18
828	881	38	41	267	309	33	28	237	254	253	249
552	581	-	-	164	190	31	28	145	157	212	206
276	300	38	41	103	119	2	0	92	97	41	43
	2013         3,635         1,876         1,013         507         239         6,128         2,700         1,294         319         258         1,174         383         4,874         869         1,172         712         212         248         530         1,014         3,278         488         938         340         1,025         487         828         552         276	2013         2014           3,635         3,599           1,876         1,839           1,013         1,044           507         496           239         220           6,128         6,390           2,700         2,750           1,294         1,367           319         323           258         287           1,174         1,258           383         405           4,874         4,930           869         847           137         159           1,152         1,204           712         714           212         207           248         264           530         532           1,014         1,003           3,278         3,375           488         485           938         946           340         353           1,025         1,087           487         504           828         881           552         581           276         300	2013         2014         2013           3,635         3,599         1,927           1,876         1,839         1,021           1,013         1,044         585           507         496         250           239         220         71           6,128         6,390         3,020           2,700         2,750         1,632           1,294         1,367         578           319         323         16           258         287         0           1,174         1,258         627           383         405         167           4,874         4,930         2,228           869         847         385           1,172         1,204         545           137         159         88           1,152         1,204         545           712         714         210           212         207         105           248         264         188           530         532         315           1,014         1,003         392           488         485         152           938	2013         2014         2013         2014 <b>3,635 3,599 1,927 1,820</b> 1,876         1,839         1,021         951           1,013         1,044         585         587           507         496         250         225           239         220         71         577 <b>6,128 6,390 3,020 3,145</b> 2,700         2,750         1,632         1,628           1,294         1,367         578         6355           319         323         16         16           258         287         0         0           1,174         1,258         627         698           383         405         167         188           4,874         4,930         2,228         2,211           869         847         385         372           137         159         88         97           1,152         1,204         545         553           712         714         210         207           2137         159         88         199	2013         2014         2013         2014         2013           3,635         3,599         1,927         1,820         1,010           1,876         1,839         1,021         951         550           1,013         1,044         585         587         209           507         496         250         225         162           239         220         71         57         89           6,128         6,390         3,020         3,165         1,710           2,700         2,750         1,632         1,628         636           1,294         1,367         578         635         281           319         323         16         16         187           258         287         0         0         258           1,174         1,258         627         698         271           383         405         167         188         77           4,874         4,930         2,228         2,211         1,107           869         847         385         372         304           1,172         1,204         545         553         236      <	2013         2014         2013         2014         2013         2014 <b>3,635 3,599 1,927 1,820 1,010 1,122</b> 1,876         1,839         1,021         951         550         597           1,013         1,044         585         587         209         250           507         496         250         225         162         186           239         220         71         57         89         89 <b>6,128 6,390 3,020 3,145 1,710 1,803</b> 2,700         2,750         1,632         1,628         636         680           1,294         1,367         578         635         281         294           319         323         166         186         182         288           1,174         1,258         627         698         271         288           383         405         167         188         77         72 <b>4,874 4,930 2,228 2,211 1,107 1,182</b> 1,172         1,204	2013         2014         2013         2014         2013         2014         2013         2014         2013           3,635         3,599         1,927         1,820         1,010         1,122         103           1,876         1,839         1,021         951         550         597         555           1,013         1,044         585         587         209         250         22           507         496         250         225         162         186         22           239         220         71         57         89         89         4           6,128         6,390         3,020         3,165         1,710         1,803         140           2,700         2,750         1,632         1,628         635         281         294         48           319         323         16         16         187         182         6           2,878         20         0         258         287         -         11           1,174         1,258         627         698         271         288         42           383         405         167         188         77	2013         2014         2013         2014         2013         2014         2013         2014 <b>3,635 3,599 1,927 1,820 1,010 1,122 103 78</b> 1,876         1,839         1,021         951         550         597         55         48           1,013         1,044         585         587         209         250         22         15           507         496         250         225         162         186         22         11           239         220         71         57         89         89         4         4 <b>6,128 6,390 3,020 3,165 1,710 1,803</b> 140         131           2,700         2,750         1,632         1,628         636         680         33         311           1,274         1,367         578         635         281         294         48         37           319         323         16         16         187         182         6         9           258         287         0         0         258	2013         2014         2013         2014         2013         2014         2013         2014         2013           3,635         3,599         1,927         1,820         1,010         1,122         103         78         4655           1,876         1,839         1,021         951         550         597         55         48         160           1,013         1,044         585         587         209         250         22         15         197           507         496         250         225         162         186         22         11         59           239         220         71         57         89         89         4         4         49           6,128         6,390         3,020         3,165         1,710         1,803         140         131         1,241           2,700         2,750         1,632         1,628         636         680         33         31         399           1,274         1,367         578         635         281         294         48         37         387           319         323         16         16         187         182	2013         2014         2013         2014         2013         2014         2013         2014         2013         2014           3,635         3,599         1,927         1,820         1,010         1,122         103         78         465         462           1,876         1,839         1,021         951         550         597         55         48         160         164           1,013         1,044         585         587         209         220         12         157         197         192           507         496         250         225         162         186         22         11         59         57           239         220         71         57         89         89         4         4         49         49           6,128         6,390         3,020         3,165         1,710         1,803         140         131         1,221         1,275           2,700         2,750         1,632         1,628         635         281         294         488         37         387         411           1,294         3,233         16         16         187         182         6 <td>2013         2014         <th< td=""></th<></td>	2013         2014         2013         2014 <th< td=""></th<>

# Students with foreign entry qualifications in autumn 2014

Foreign-educated students are people of non-Swiss nationality who lived abroad before commencing their studies, i.e. those students who came to Switzerland expressly for the purpose of studying. The table shows the number of enrolments, by country of residence before studying at ETH Zurich.

	2014		Bachelo students	r's S	Master's students	5	Visiting/ change s	ex- students	Doctoral students	L 5	MAS/ME students	BA 5
	Total	in %		in %		in %		in %		in %		in %
ETH Zurich total	6,323	100	1,259	100	1,842	100	309	100	2,679	100	234	100
EU	4,537	71.8	1,105	87.8	1,262	68.5	197	63.8	1,807	67.5	166	70.9
Germany	2,269	35.9	643	51.1	551	29.9	52	16.8	943	35.2	80	34.2
Austria	410	6.5	181	14.4	87	4.7	7	2.3	123	4.6	12	5.1
Italy	399	6.3	51	4.1	119	6.5	24	7.8	191	7.1	14	6.0
Greece	238	3.8	9	0.7	138	7.5	1	0.3	63	2.4	27	11.5
France	221	3.5	24	1.9	74	4.0	9	2.9	111	4.1	3	1.3
Luxembourg	183	2.9	115	9.1	51	2.8	0	-	17	0.6	0	-
Netherlands	120	1.9	3	0.2	54	2.9	18	5.8	43	1.6	2	0.9
Spain	117	1.9	30	2.4	31	1.7	11	3.6	38	1.4	7	3.0
Poland	79	1.2	4	0.3	19	1.0	1	0.3	52	1.9	3	1.3
United Kingdom	75	1.2	6	0.5	20	1.1	10	3.2	34	1.3	5	2.1
Romania	64	1.0	8	0.6	22	1.2	0	-	32	1.2	2	0.9
Sweden	57	0.9	4	0.3	9	0.5	32	10.4	11	0.4	1	0.4
Hungary	36	0.6	8	0.6	6	0.3	0	-	20	0.7	2	0.9
Others	269	4.3	19	1.5	81	4.4	32	10.4	129	4.8	8	3.4
Rest of Europe	412	6.5	93	7.4	120	6.5	12	3.9	171	6.4	16	6.8
Turkey	110	1.7	34	2.7	29	1.6	0	-	46	1.7	1	0.4
Russian Federation	103	1.6	8	0.6	25	1.4	2	0.6	58	2.2	10	4.3
Liechtenstein	71	1.1	43	3.4	19	1.0	0	-	6	0.2	3	1.3
Republic of Serbia	42	0.7	0	-	15	0.8	0	-	27	1.0	0	-
Others	86	1.4	8	0.6	32	1.7	10	3.2	34	1.3	2	0.9
Asia	881	13.9	34	2.7	299	16.2	61	19.7	455	17.0	32	13.7
China	353	5.6	19	1.5	157	8.5	17	5.5	155	5.8	5	2.1
India	184	2.9	0	-	63	3.4	3	1.0	107	4.0	11	4.7
Iran	86	1.4	4	0.3	6	0.3	4	1.3	67	2.5	5	2.1
Japan	39	0.6	1	0.1	1	0.1	21	6.8	12	0.4	4	1.7
Others	219	3.5	10	0.8	72	3.9	16	5.2	114	4.3	7	3.0
Americas	390	6.2	21	1.7	128	6.9	28	9.1	197	7.4	16	6.8
United States of America	155	2.5	5	0.4	57	3.1	16	5.2	73	2.7	4	1.7
Canada	74	1.2	0	-	27	1.5	4	1.3	42	1.6	1	0.4
Mexico	42	0.7	4	0.3	16	0.9	4	1.3	18	0.7	0	-
Brazil	35	0.6	6	0.5	5	0.3	2	0.6	20	0.7	2	0.9
Colombia	30	0.5	0	-	7	0.4	1	0.3	20	0.7	2	0.9
Others	54	0.9	6	0.5	16	0.9	1	0.3	24	0.9	7	3.0
Africa	64	1.0	1	0.1	20	1.1	5	1.6	35	1.3	3	1.3
Australia and New Zealand	39	0.6	5	0,4	13	0.7	6	1.9	14	0.5	1	0.4

# Degrees

	Bachelor's d	legrees			Master's deg	grees		
	2013 Total	2014 Total	Women	International students	2013 Total	2014 Total	Women	International students
ETH Zurich total	1,447	1,579	507	291	1,847	1,839	552	640

### Programmes

Architecture and Building Sciences	293	369	128	56	354	395	147	92
Architecture	149	200	99	34	213	242	104	66
Civil Engineering	85	94	11	14	75	69	11	9
Environmental Engineering	49	58	15	8	41	50	20	12
Geomatic Engineering and Planning	10	17	3	0	25	34	12	5
Engineering Sciences	508	510	56	107	607	660	100	285
Mechanical Engineering	262	284	27	68	188	232	18	80
Electrical Engineering and Information Technology	111	95	9	23	97	129	15	40
Biosciences and Engineering	25	13	5	1	72	80	32	48
Interdisciplinary Engineering Sciences	-	-	-	-	84	82	15	62
Computer Science	79	91	6	12	128	109	15	50
Materials Science	31	27	9	3	38	28	5	5
Natural Sciences and Mathematics	386	386	145	106	476	440	140	161
Mathematics	71	53	12	18	97	116	29	50
Computational Science and Engineering	5	13	2	1	25	6	1	3
Physics	98	75	11	37	113	96	15	53
Chemistry	35	44	15	13	44	44	14	21
Chemical Engineering	18	23	2	13	18	12	1	5
Interdisciplinary Sciences	25	21	5	8	19	21	6	7
Pharmaceutical Sciences	47	86	67	10	74	55	37	3
Biology	87	71	31	6	86	90	37	19
System-oriented Natural Sciences	246	303	178	22	323	287	149	74
Earth Sciences	23	28	12	2	97	83	25	41
Environmental Sciences	99	85	52	7	107	78	40	20
Agricultural Sciences	31	41	18	1	20	25	15	0
Health Sciences and Technology	58	83	51	7	59	57	38	2
Food Sciences	35	66	45	5	40	44	31	11
Management and Social Sciences	14	11	0	0	87	57	16	28
Management, Technology and Economics	_	-	-	-	64	35	5	19
Humanities, Social and Political Sciences	14	11	0	0	23	22	11	9

# Doctorates and degrees of continuing education

Doctorates			
2013	2014		International
Total	Total	Women	students
ETH Zurich total 579 1	769	234	513

### Department

Architecture and Building Sciences	37	78	23	52
Architecture	6	20	8	12
Civil, Environmental and Geomatic Engineering	31	58	15	40
Engineering Sciences	154	228	40	164
Mechanical and Process Engineering	52	87	10	59
Information Technology and Electrical Engineering	52	72	12	53
Computer Science	25	37	8	26
Materials	18	20	8	16
Biosystems Science and Engineering	7	12	2	10
Natural Sciences and Mathematics	207	262	89	178
Mathematics	21	24	6	17
Physics	41	51	6	29
Chemistry and Applied Biosciences	89	102	31	71
Biology	56	85	46	61
System-oriented Natural Sciences	144	155	65	94
Earth Sciences	12	34	8	24
Environmental Systems Science	94	72	36	47
Health Sciences and Technology	38	49	21	23
Management and Social Sciences	37	46	17	25
Management, Technology and Economics	26	27	8	15
Humanities, Social and Political Sciences	11	19	9	10

### Degrees of continuing education

Certificates of Advanced Studies (CAS)

Degrees of continuing education (MAS, MBA, DAS, CAS) aim to give greater depth or interdisciplinary breadth to specialist skills. Master's programmes (MAS and MBA) can open up the possibility of a new career. Degree and certificate courses (DAS and CAS) are intended for university graduates currently in employment and seeking further professional development or specialisation. 2013 2014 International Total Total Women Master's of Advanced Studies (MAS, MBA) 228 205 74 Diplomas of Advanced Studies (DAS) 55 5 1

### **Teacher training**

The following diplomas and certificates certify graduation from a teacher training course.	2013 Total	2014 Total	Women	International students
Teaching diplomas for grammar schools/MAS SHE	59	55	25	5
Teaching certificates	24	26	13	0

students

49

102

109

113

2

47

1 As a result of the revision of the Regulations for Doctoral Studies, the date for deregistration was changed from December 2013 to January 2014. This explains the fall in doctoral graduations to 579; without this change, 754 doctoral students would have graduated in 2013.

# Staff by discipline

The number of staff is shown in full-time equivalents (FTEs) as at the end of the year and is based on the current organisational structure at ETH Zurich as of 31 December 2014, even for the previous year. The breakdown by discipline reflects an internal management point of view. For internal cost control purposes, expenditure is divided into three categories: core and additional finances, which come mainly from the federal financial contribution; and other funds, financed entirely by third parties. Of the 6,011 FTEs financed by basic funding, 133 FTEs were financed by third-party funding.

	2013	Core and additional		2014	Core and additional	
	Total	finances	Other funds	Total	finances	Other funds
Grand total	7,913.7	5,860.7	2,053.0	8,143.01	6,010.7	2,132.2
Total teaching and research	6,785.1	4,750.9	2,034.1	6,967.7	4,848.2	2,119.4
Departments	6,573.1	4,600.3	1,972.8	6,709.3	4,655.6	2,053.7
Architecture and Building Sciences	947.4	726.1	221.2	939.1	699.1	240.0
Architecture	401.6	335.5	66.1	404.8	335.6	69.2
Civil, Environmental and Geomatic Engineering	545.8	390.6	155.1	534.3	363.5	170.8
Engineering Sciences	1,898.6	1,270.0	628.6	1,985.5	1,310.6	674.9
Mechanical and Process Engineering	602.0	372.4	229.6	631.6	413.5	218.0
Information Technology and Electrical Engineering	516.1	339.8	176.3	546.3	351.8	194.5
Computer Science	352.1	253.5	98.6	358.0	250.4	107.6
Materials	204.9	148.7	56.2	212.7	133.5	79.2
Biosystems Science and Engineering	223.6	155.7	67.9	237.0	161.4	75.6
Natural Sciences and Mathematics	2,054.2	1,450.7	603.5	2,060.3	1,484.0	576.3
Mathematics	237.0	185.1	51.9	237.2	176.2	61.1
Physics	572.9	419.4	153.4	566.7	417.3	149.4
Chemistry and Applied Biosciences	699.2	486.3	212.9	690.4	519.2	171.2
Biology	545.1	359.9	185.2	566.0	371.4	194.7
System-oriented Natural Sciences	1,167.5	820.3	347.2	1,198.5	819.7	378.8
Earth Sciences	258.7	168.6	90.1	274.5	171.2	103.3
Environmental Systems Science	548.6	408.4	140.2	567.5	403.9	163.6
Health Sciences and Technology	360.1	243.3	116.8	356.5	244.6	111.8
Management and Social Sciences	505.5	333.1	172.3	525.8	342.1	183.7
Management, Technology and Economics	278.3	201.5	76.8	285.6	207.3	78.3
Humanities, Social and Political Sciences	227.2	131.7	95.5	240.2	134.8	105.4
Extra-departmental teaching and research units, others <sup>2</sup>	211.9	150.7	61.3	258.4	192.6	65.8
CSCS	62.8	53.3	9.5	61.1	53.2	8.0
ETH Phenomics Center (EPIC)	12.3	12.3	0.0	30.1	30.1	0.0
Swiss Seismological Service (SED)	47.0	19.0	28.0	48.7	25.5	23.2
Further teaching and research units, others	89.9	66.1	23.8	118.5	83.9	34.6

Total Executive Board, central authorities and infrastructure divisions	1,128.7	1,109.8	18.9	1,175.3	1,162.5	12.8
Infrastructure divisions	955.5	943.4	12.1	991.2	980.9	10.3
Central authorities and other staff	173.1	166.4	6.8	184.1	181.6	2.5

A new regulation regarding scientific staff went into effect at ETH Zurich on 1 January 2015. It generally requires all doctoral students to be employed full-time. This change will be reflected in the 2015 reporting as an increase of 647 FTEs over the 2014 figure of 8,790 FTEs [6,356 basic and supplementary funding; 2,434 other resources].
 2 "Extra-departmental teaching and research units, others" refers to research units as defined in ETH Zurich's Organisational Ordinance and other units such as Executive Board projects in the areas of education and research.

# Staff by function

				Change from prev	ious year
	2013	2014	Percentage		
	Total	Total	women	in FTEs	in %
Grand total	7,913.7	8,143.01	31.6	229.2	2.9
of which temporary positions	5,364.3	5,464.7	29.8	100.4	1.9

Total teaching and research	6,785.1	6,967.7	30.2	182.6	2.7
of which temporary positions	5,211.9	5,311.5	29.2	99.6	1.9
Professorships	462.1	463.1	12.9	1.1	0.2
Full/Associate professorships	384.8	383.1	10.7	-1.7	
Assistant professorships	77.3	80.0	23.2	2.7	
Scientific staff	4,923.8	5,061.0	27.6	137.3	2.8
Senior scientists and permanent scientific staff	244.6	255.4	13.9	10.7	
Senior assistants and temporary scientific staff	526.0	521.7	25.3	-4.4	
Scientific research assistants II and postdoctoral students	1,181.3	1,224.6	28.3	43.3	
Scientific research assistants I	2,697.8	2,736.31	28.0	38.5	
Teaching/research assistants	274.0	323.1	35.7	49.1	
Technical and administrative staff	1,270.3	1,311.5	46.9	41.3	3.2
Technical and IT staff	782.2	792.4	24.9	10.2	
Administrative staff	488.1	519.1	80.6	31.0	
Apprentices	129.0	132.0	24.2	3.0	2.3

Total Executive Board, central authorities and infrastructure divisions*	1,128.7	1,175.3	40.3	46.6	4.1
of which temporary positions	152.4	153.2	51.7	0.9	0.6
Professorships	4.0	4.0	-	0.0	
Scientific staff	1.2	3.7	56.2	2.5	
Technical and IT staff	492.0	502.5	11.4	10.6	
Administrative staff	594.5	623.0	63.6	28.5	
Apprentices	37.0	42.0	42.9	5.0	

* Staff in infrastructure divisions	955.5	991.2	38.0	35.6	3.7
Corporate Communications	25.2	26.9	67.3	1.7	6.7
Rectorate	65.2	65.7	69.0	0.5	0.8
Finance and Controlling	77.6	82.6	51.4	5.0	6.4
Building and Constructions	57.0	64.5	33.0	7.5	13.2
Facility Management	187.2	187.5	19.8	0.4	0.2
Library	215.8	217.1	61.6	1.3	0.6
IT Services	225.6	240.5	12.5	14.8	6.6
Human Resources and Services	101.9	106.4	45.5	4.5	4.4

1 A new regulation regarding scientific staff went into effect at ETH Zurich on 1 January 2015. It generally requires all doctoral students to be employed full-time. This change will be reflected in the 2015 reporting as an increase of 647 FTEs over the 2014 figure of 8,790 FTEs (of which 3,383 FTEs are scientific assistants in temporary employment).

# Overall view of expenditure

The breakdown by use and by discipline (see next page) reflects an internal management point of view. For internal cost control purposes, expenditure is divided into three categories: core and additional finances, which come mainly from the federal financial contribution; and other funds, financed entirely by third parties.

### in CHF 1,000

						Change from
Expenditure by source	2010	2011	2012	2013	2014	previous year in %
Total expenditure	1,359,255	1,454,762	1,466,810	1,512,315	1,556,190	2.9
Federal financial contribution (income)	1,094,189	1,088,947	1,101,004	1,146,761	1,210,320	5.5
Advance funding for implementation of the HPCN strategy/new CSCS building	- 12,355	12,355				
Federal financial contribution (expenditure)	1,081,834	1,101,302	1,101,004	1,146,761	1,210,320	5.5
Expenditure of third-party resources	277,421	353,460	365,806	365,554	345,870	- 5.4
National organisations (research sponsorship)	99,122	101,042	110,881	116,012	117,488	1.3
Research contracts from federal offices (federal research contracts)	22,873	22,781	23,804	23,323	20,693	- 11.3
European research programmes (Framework Programmes)	42,914	40,019	44,789	52,887	56,575	7.0
Partnerships with business, other third-party funding	99,668	166,328	167,289	147,557	120,902	- 18.1
Endowments and legacies	12,845	23,290	19,043	25,774	30,212	17.2

Expenditure by use	2010	2011	2012	2013	2014	Change from previous year in %
Total expenditure	1,359,255	1,454,762	1,466,810	1,512,315	1,556,190	2.9
Overall expenditure (excl. investment)	1,168,367	1,181,020	1,249,599	1,280,487	1,343,014	4.9
Personnel expenses	859,042	890,991	923,254	959,961	995,392	3.7
Materials expenses	309,325	290,029	326,345	320,526	347,623	8.5
Investment expenses	190,888	273,742	217,211	231,828	213,175	-8.0
Investment credit/co-financing (FBL)1	100,000	104,600	85,200	104,500	110,600	5.8
Movables, machinery, vehicles, IT equipment	90,888	169,142	132,011	127,328	102,575	- 19.4
Basic funding and supplementary funding	1,085,906	1,154,601	1,153,652	1,178,688	1,228,299	4.2
Overall expenditure (excl. investment)	911,088	893,736	957,837	972,470	1,035,726	6.5
Personnel expenses	687,488	701,005	721,947	749,242	777,299	3.7
Materials expenses	223,600	192,730	235,890	223,228	258,427	15.8
Investment expenses	174,819	260,865	195,816	206,218	192,573	-6.6
Investment credit (FBL) <sup>1</sup>	100,000	104,000	80,200	96,420	108,700²	12.7
Movables, machinery, vehicles, IT equipment	74,819	156,865	115,616	109,798	83,873	- 23.6
Other resources	273,348	300,161	313,158	333,627	327,891	- 1.7
Overall expenditure (excl. investment)	257,279	287,284	291,762	308,017	307,289	-0.2
Personnel expenses	171,554	189,986	201,307	210,719	218,093	3.5
Materials expenses	85,724	97,298	90,455	97,298	89,196	-8.3
Investment expenses	16,069	12,876	21,396	25,610	20,602	- 19.6
Co-financing (FBL) <sup>1</sup>	0	600	5,000	8,080	1,900	- 76.5
Movables, machinery, vehicles, IT equipment	16,069	12,276	16,396	17,530	18,702	6.7

FBL = Federal Office for Buildings and Logistics, BBL.
 Of the investment credit in 2014, CHF 79.4 million was for capitalisable expenses, CHF 29.3 million was spent on maintenance and repairs.

# Overall view of expenditure (cont.)

in CHF 1,000

Expenditure by discipline Use of funds by type of expe							
	2014 Total	Core finances	Additional finances	Other funds	Personnel	Materials	Investments
Grand total	1,556,190	1,058,301	169,998	327,891	995,392	347,623	213,175
Total teaching and research	1,018,262	626,731	94,346	297,185	803,601	154,582	60,078
Departments	941,420	582,701	82,028	276,691	769,977	130,714	40,730
Architecture and Building Sciences	127,416	86,831	11,175	29,410	107,316	16,690	3,410
Architecture	58,111	41,856	5,455	10,801	47,996	8,631	1,483
Civil, Environmental and Geomatic Engineering	69,305	44,976	5,720	18,609	59,320	8,059	1,927
Engineering Sciences	260,010	159,267	21,300	79,443	215,492	33,745	10,774
Mechanical and Process Engineering	76,472	43,220	6,671	26,581	64,560	8,954	2,958
Information Technology and Electrical Engineering	69,893	42,739	4,858	22,296	58,887	8,692	2,314
Computer Science	46,898	31,880	2,454	12,563	41,599	4,829	470
Materials	32,466	19,754	4,050	8,663	25,605	4,871	1,991
Biosystems Science and Engineering	34,281	21,674	3,267	9,340	24,842	6,399	3,040
Natural Sciences and Mathematics	308,840	185,282	30,680	92,878	242,146	48,254	18,440
Mathematics	36,643	26,569	3,585	6,489	34,860	1,764	20
Physics	82,687	49,926	6,722	26,039	64,094	12,280	6,313
Chemistry and Applied Biosciences	104,107	63,293	11,238	29,577	79,944	16,435	7,727
Biology	85,402	45,495	9,134	30,772	63,248	17,774	4,380
System-oriented Natural Sciences	173,611	107,359	16,029	50,223	143,728	21,851	8,031
Earth Sciences	42,422	23,755	4,251	14,416	34,355	5,763	2,303
Environmental Systems Science	81,205	53,621	7,639	19,945	68,322	9,100	3,783
Health Sciences and Technology	49,983	29,983	4,138	15,862	41,050	6,988	1,945
Management and Social Sciences	71,544	43,961	2,846	24,737	61,295	10,174	74
Management, Technology and Economics	37,770	25,078	1,552	11,141	32,765	5,006	
Humanities, Social and Political Sciences	33,774	18,884	1,294	13,596	28,530	5,169	74
Extra-departemental teaching and research units, others	76,842	44,030	12,318	20,494	33,625	23,869	19,349

Total Executive Board, central authorities, infrastructure divisions and building investments	537,928	431,570	75,651	30,706	191,790	193,040	153,097
Total Executive Board, central authorities and infrastructure divisions	427,328	322,870	75,651	28,806	191,790	193,040	42,497
Investment credit/co-financing (FBL)1	110,600	108,700		1,900			110,600

1 FBL = Federal Office for Buildings and Logistics, BBL

# **Environmental statistics**

ETH Zurich's heating and electricity usage was lower in 2014 than in 2013. By switching to a different type of electricity (hydroelectricity), the university increased the proportion of electricity it draws from renewable resources to 95 percent. The amount of heat recovered from the cooling systems was increased by a further 0.1 gigawatt hours (GWh) to 11.9 GWh. This meant that ETH Zurich covered around 26 percent of its heating requirements by using waste heat from cooling systems. Direct CO<sub>2</sub> emissions were reduced in 2014 to 5,526 tonnes (excluding coolants).

	2010	2011	2012	2013	2014
Total electricity demand	113.1	111.0	111.8	113.0	111.9
Percentage from renewable sources	89%	23 %	24 %	62%	95%
Total produced on site	2.3	1.1	0.2	0.2	0.3
Production from combined heat and power unit (CHP), decommissioning 2013	2.1	0.9	0.0	0.0	0.0
Production from photovoltaic cells	0.2	0.2	0.2	0.2	0.3
Total electricity purchased	110.8	109.9	111.6	112.8	111.6
Electricity purchased for buildings	96.6	98.5	101.5	103.2	104.8
Electricity purchased for Walche heat pump	14.2	11.4	10.1	9.6	6.8
Heating (in GWh)	2010	2011	2012	2013	2014
Total heat demand of ETH Zurich (net energy)	51.1	45.3	50.7	53.8	45.6
Percentage from renewable sources	55%	43 %	42 %	55%	<b>59</b> %
Total heat produced (net energy)	81.9	70.7	77.9	83.1	68.5
Sale of heat to third parties (net energy)	- 30.8	-25.4	-27.2	- 29.2	- 23.0
Total heat produced (net energy including external purchasers)	81.9	70.7	77.9	83.1	68.5
District heating	11.7	11.2	21.6	21.8	17.8
Walche heat pump	33.9	31.5	27.3	26.3	19.4
Fossil fuels					
Gas (excluding gas for CHP electricity)	38.5	26.6	25.5	31.2	27.4
Oil	0.0	4.2	5.9	0.0	0.0
Non-fossil fuels					
Woodchips	0.7	0.5	0.5	0.5	0.5
From heat recovery	6.6	7.9	8.9	11.8	11.9
Losses during conversion	- 9.5	-11.1	- 11.8	- 8.5	-8.6
Relative amounts					
Electricity demand (kWh/FTE1), excl. electricity for heat pump	6,176.1	5,880.7	5,826.2	5,780.6	5,711.1
Heat demand/energy-consuming area (kWh/m²)	82.5	73.1	80.2	83.0	68.6
Total energy demand/FTE (kWh/FTE)	9,369.3	8,554.9	8,732.5	8,789.4	8,188.1
Total energy demand/energy-consuming area (kWh/m²)	242.0	233.9	241.1	242.6	226.8
Emissions of CO <sub>2</sub> equivalents (tonnes CO <sub>2</sub> eq.)	2010	2011	2012	2013	2014
Total CO <sub>2</sub> eq. emissions	25,258	23,652	25,773	26,487	27,060
Direct CO <sub>2</sub> eq. emissions					
Gas and district heating	7,806	4,937	4,655	5,620	5,521
Oil	0	1109	2088	11	5
Coolants (newly recorded in 2014)	62	62	62	62	517
Indirect CO <sub>2</sub> eq. emissions					
Purchased electricity (according to environmental declaration)	1,462	1,609	1,606	1,585	1,471
Commuter traffic (recorded once in 2008)	1,714	1,714	1,714	1,714	1,714
Business travel	14,214	14,221	15,648	17,495²	17,832²

# Organisational chart 2014



# Competence centres

### **Competence centres at ETH Zurich**

Energy Science Center (ESC)

Kompetenzzentrum für Lehren und Lernen (EducETH)

Competence Centre for Materials and Processes (CC-MaP)

**Risk Center** 

World Food System Center

	Competence centres in collaboration with other universities and institutions	Competence centres in the ETH Domain	
		National Competence Center in	
	Centre for Climate Systems Modeling (C2SM)	Biomedical Imaging (NCCBI)	
		Competence Center Energy and Mobility	
	Competence Center for Personalized Medicine (CC-PM)	(CCEM)	
		Competence Center Environment and Sustainability (CCES)	
	Zurich-Basel Plant Science Center (PSC)		
	Neuroscience Center Zurich (ZNZ)	Competence Center for Materials Science and Technology (CCMX)	
	Zurich Center for EXperimental and		
	Clinical Imaging TEchnologies (EXCITE)		

### the ETH Domain

As of 31	December 2014

# ETH Zurich Executive Board



**Robert Perich** (1961), who has **Roman Boutellier** (1950) a doctorate in Rusiness Administration, has been Head of the Finance and Controlling division at ETH Zurich since 2003 and Vice President Finance and Controlling since October for 11 years in the financial services industry, most recently as CFO and member appointed to ETH Zurich, he of the Executive Board of the held various management Private Banking Switzerland positions in Swiss industry. division of a leading Swiss bank.

has been Professor for Technology and Innovation Management at ETH Zurich since 2004 and Vice President Human Resources and Infrastructure since October 2008. From 1993 to 1999 he 2008. Before that, he worked was Professor for Innovation researchers at the German and Logistics at the University Electron Synchrotron (DESY), of St. Gallen. Before he was and from 2002 he was Zurich since September 2007.

Ralph Eichler (1947) was Lino Guzzella (1957) was appointed to ETH Zurich in elected Associate Professor in 1989 and has been Full Professor for Experimental Physics at ETH Zurich since 1993. From 1995 to 1997. he headed an international partnership of about 400 Director of the Paul Scherrer of Thermotronics. Since Institute (PSI). Ralph Eichler August 2012, Lino Guzzella has been President of ETH

### 1993 as an Assistant Professor in the Department of Mechanical and Process Engineering. Before that, he had worked in corporate research at Sulzer and as Head of Development in Mechatronics at Hilti. In 1999 he became Full Professor has been Rector of ETH Zurich and deputy to the President.

Roland Siegwart (1959) has been Full Professor for Autonomous Systems at ETH Zurich since July 2006 and Vice President Research and Corporate Relations since January 2010. From 1996 he was Professor for Autonomous Microsystems at the École Polytechnique Fédérale de Lausanne (EPFL): before that, he worked in industry for many years and was co-founder of a number of spin-off companies at EPFL and ETH Zurich.

## Changes in the Executive Board as of 2015



The new president: Lino Guzzella

Lino Guzzella, rector of ETH Zurich since 2012, Sarah Springman succeeds Lino Guzzella as is Ralph Eichler's successor. As president of ETH Zurich he will bear legal and political responsibility for the university from January 2015. He prepares the appointment of professors, decides on the allocation of the budget and determines strategy in agreement with the at all levels and organising and managing rest of the Executive Board. His core duties also study-related matters, including the examinainclude fostering relations with government authorities, political bodies and the general public.

Born in Zurich in 1957, Guzzella studied mechanical engineering at ETH Zurich in what bridge. She spent five years working as an is now the Department of Mechanical and Process Engineering, where he has been a full professor of thermotronics since 1999. Before eventually deciding on an academic career, he spent several years in industry.

rector. After Heidi Wunderli-Allenspach, she is the second woman to hold this position. As rector. Springman will be the Executive Board member in charge of the teaching portfolio. The rector is responsible for admission to courses tion process. She is also responsible for collaboration with secondary schools.

The new rector:

Sarah Springman

studied engineering at the University of Camengineer on various geotechnical projects in England, Fiji and Australia before resuming her academic career. She has been a full professor of geotechnics at ETH Zurich since 1997.

### Remuneration

In 2014, the salaries of the five members of the Executive Board, including Ralph Eichler: Member of the Board of Directors the employer's social security contributions, came to 2.05 million francs (last year 2.02 million francs), with the highest salary being 0.44 million francs (last year 0.43 million francs). The total sum includes 0.45 million francs for the employer's social security contributions (last year 0.44 million francs).

### Secondary employment

of Belenos Clean Power Holding AG

Lino Guzzella: Member of the Board of Directors of Kistler Holding AG

Roland Siegwart: Member of the Board of Directors of Komax AG, Member of the Board of Trustees of Gebert Rüf Stiftung

Robert Perich: None

Roman Boutellier: Member of the Board of Directors of Georg Fischer AG, Member of the Board of Directors of Appenzeller KB, Chairman of the Board of Directors of Ammann BauAusrüstung AG, Member of the Board of Directors of Rychiger AG, Member of the Board of Trustees of Vontobel-Stiftung

As of 31 December 2014



The new vice president of research and corporate relations: Detlef Günther

Springman was born in London in 1956 and

As Roland Siegwart's successor on the Executive Board, Detlef Günther will be responsible for strategic research supervision and funding as well as the transfer of technology, with a view to enabling ETH Zurich's research results to find their applications. He will be in charge of collaboration with industry and represent the Executive Board on research policy committees.

Günther's appointment brings a chemist to the Executive Board. A 51-year-old German national, he took his first degrees and his doctorate at the Martin Luther University of Halle Wittenberg. He embarked on his career at ETH Zurich in 1995 in the Department of Earth Sciences before switching to the Department of Chemistry three years later. He has been a full professor for trace element and micro analysis at the Laboratory of Inorganic Chemistry since 2008. He was head of the Department of Chemistry and Applied Biosciences from 2010 to 2012.

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