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## Switzerland, career paradise

04 November 2009 by **Kate McAlpine**

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WITH picturesque Alpine villages, vast expanses of skiable terrain, and delectable fondue, Switzerland is a popular holiday destination. But those same mountains also spur innovative engineering and provide exciting research opportunities in snow and climate studies. Down in the cities, with clean streets, punctual buses and fine chocolate, you'll also find top industrial research centres and well-equipped scientific institutes.

As funding is readily available through the Swiss National Science Foundation, and with salaries as high as £160,000 for full professors, might this country be a researcher's paradise? *New Scientist* investigates.

### Willkommen in Zürich

Zurich is home to the University of Zurich, an IBM research centre and one of the two Swiss Federal Institutes of Technology. About 30 kilometres west of Zurich, the [Paul Scherrer Institute \(PSI\)](#) makes up the third in the suite of three government-funded research centres.

The [Swiss Federal Institute of Technology](#) in Zurich (ETHZ) covers science from all angles. In addition to natural sciences, social sciences and maths, the institute boasts several strong engineering departments - from architecture to biosystems.

As a geotechnical engineer at ETHZ, one of Sarah Springman's areas of research is unstable soil in the mountains. Since rockfalls and landslides dare to obstruct Switzerland's famously well-run rail system, these studies go well beyond the laboratory.

Springman first visited ETHZ in 1994, while working at the [University of Cambridge](#). "My chin nearly hit the ground when I saw the wonderful laboratories," she recalls.

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She considers the teaching schedule to be demanding: "I teach much more than I would expect to teach at Cambridge." But the responsibilities come with benefits: money to support a scientific group, and joint teaching and research assistants to share the task of preparing and marking assignments.

A short journey north-west of ETHZ will take you to PSI, the home of many top scientists. It's fitting that this year's chemistry prize has been awarded to Venkatraman Ramakrishnan, who used the institute's £95 million [Swiss Light Source](#) for his prize-winning studies on the structure of the ribosome. The SLS is one of PSI's primary facilities, providing super-bright photon beams to teams seeking to understand chemical and magnetic properties of materials, or create detailed images of animal tissues.

Not all Swiss chemists work in the lab, though. Some, such as Margit Schwikowski, who leads the analytical chemistry group, use their surroundings. "We work with ice cores from high Alpine glaciers," she says. Her focus is past climate variability and pollution. In addition to the main laboratory north of Zurich, PSI collaborates with an international high-altitude research station at Jungfraujoch, 3580 metres above sea level.

### Bern entdecken

The [University of Bern](#) is a sprawling intellectual behemoth, covering all the sciences and liberal arts and boasting more than 25 institutes focused on maths and science research.

Irving Dindoyal started at the University of Bern in August, working as a postdoc on medical imaging. "I think the people are very friendly. They're very welcoming to outsiders," he says.

Swiss medical-data laws protect patient anonymity, yet Dindoyal has still found it easier to obtain data for his research in Switzerland than in the UK.

Dindoyal has already experienced Swiss collaboration, regularly meeting with a group at the Swiss Federal Institute of Technology in Lausanne. The short distances between Switzerland's cities promotes collaboration, says Schwikowski. "It's nice that you can easily go to a seminar in Zurich or Bern."

### Bienvenue à Genève

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Just west of Geneva lies [CERN](#), the nuclear and particle physics centre whose famous particle-accelerator rings cross the border with France.

The laboratory's real estate may be shared with France, but Switzerland houses the headquarters. The Large Hadron Collider (LHC), the world's most powerful particle accelerator (when it's working), is designed to explore the most fundamental aspects of matter - the particles that make up everything we know and the forces that govern them. UK residents can get in on the action through universities at home, or by applying for [employment at CERN](#).

Many of its resources are focused on the proton-smashing LHC and its experiments, but the centre also runs an [antiproton ring](#) whose prime purpose is to study the intriguing physics of antimatter. Two of these experiments aim to make and trap anti-hydrogen atoms for close comparison with ordinary hydrogen - a glimpse into the anti-world.

Those working at CERN can choose to live in the city or the French countryside, and the laboratory boasts one of the best ski clubs in Geneva.

Most institutes provide help with any necessary documents, initial housing and even support for getting spouses settled. Expats are in good company: 40 to 80 per cent of faculty and scientists in Swiss institutes have been lured from other nations.

Some UK researchers find ways to bring pieces of British culture along. Springman misses the unspoken competition between students to ask the most difficult question in a technical seminar. "One tries to recreate that a little bit with one's PhD students, to help them think on their feet and ask key questions," she says. "They all quite like a silly English sense of humour."

### Reaching new heights

Fancy flying around the world in a solar-powered plane? Even the 70 members of the [Solar Impulse](#) team think it's crazy, but it doesn't keep them - and 80 expert consultants - from trying.

The programme, based in Dübendorf and Lausanne and led by Bertrand Piccard and André Borschberg, has now produced its first prototype. HB-SIA is set to take off for a historic first crewed night flight in 2010.

With a night-and-day average of only 8 horsepower available, the aircraft combines the wingspan of an Airbus A340 with the weight of a mid-sized car. Solar cells don't just cover the tops of the wings - they're an integral part of the structure.

Space is very tight on board and there is only room for a single pilot and enough provisions for a 36-hour flight. The long flight times inspired the team to design a warning system which is integrated into the pilot's clothing, so that at times of rest they needn't rely on lights and alarms on the dashboard. "In very long flights, when the pilot is resting and maybe not fully concentrating, he will feel this information through vibrations," says Borschberg, and so be able to react quickly to any problems.

Next spring, the team will be seeking out new talent to help design the next model, intended to circumnavigate the globe, powered by nothing but sunshine.

### What's hot?

**Swiss Cube**

Launched on 23 September, the [Swiss Cube](#) satellite marked Switzerland's first satellite foray into the final frontier. The probe, produced at the Swiss Federal Institute of Technology in Lausanne, is designed to map the brightness of the night-glow in the upper atmosphere. Each of its sides measures just 10 centimetres. The main aim of the project, which involves 200 students, is to teach young researchers.

### 2000-Watt Society

A group of professors at ETHZ has dreamed up a model for sustainable energy-consumption: the [2000-Watt Society](#). Their goal: to reduce the energy consumption of people in developed nations, from over 5000 watts to the global average of 2000. The institute is researching efficient buildings and transport, testing them out on the eco-friendly population of Basel.

### SenseSoar

This solar-powered project aims to find people lost in wild terrain or buried under rubble. ETHZ's uncrewed "SenseSoar" is a winged plane that will fly autonomously over the terrain in question, beaming infrared data that its scanners have detected back to base. Its infrared sensors and batteries will allow it to continue a search in darkness, when crewed flights would be brought to a halt.

### DNA Dating

This matchmaking site has the laws of attraction down to an exact science. Zurich-based GenePartner takes a Swiss researcher's "sweaty T-shirt study" to a marketable level. Claus Wedekind's 1995 experiment found that women prefer the scents of men whose immune systems are considerably different from their own. The company provides DNA compatibility profiles for couples or singles.

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