

FINDING SOLUTIONS FOR

A
SUSTAINABLE
FUTURE



ENAC

SCHOOL OF ARCHITECTURE,
CIVIL AND ENVIRONMENTAL ENGINEERING



DESIGN
& BUILD
TOGETHER

FOREWORD

As the new Dean of ENAC, I am pleased to present you with the 2013 edition of the ENAC Annual Report, looking back on a year of significant change and growth for the School which continues to exemplify innovation and creativity in finding solutions for a sustainable future.

What makes ENAC exceptional? First and foremost, it is unique among leading academic institutions worldwide in uniting a diverse faculty of researchers, engineers, architects, and social scientists, who are joined by a passion for the quality of our surroundings, and engage together through a common language to find solutions to the most pressing problem of our time: achieving a sustainable environment for humanity through a successful integration of human activities within the biosphere.

While 2013 was a year of change in ENAC at the level of its direction, academically it was a year of continued excellence and achievements at many levels as you will read in this activity report, including remarkable successes within our tenure-track faculty such as Nikolas Geroliminis's ERC grant and two tenure promotions, for Rizlan Bernier-Latmani and Alexis Berne.

ENAC has become the ideal place to launch interdisciplinary projects. Transversal initiatives such as the Affinity Map, which visualizes synergies and dynamics between ENAC's research groups and identifies signature trans-disciplinary themes for the School, will accompany us for years to come. More than ever, ENAC will play an active role in federating research activities across the campus through its role as strategic coordinator of EPFL's participation in the 2016 Solar Decathlon Europe, an international university competition that brings together students to imagine, design, and build a fully functional solar house, representative of tomorrow's sustainable housing solutions.

ENAC is leading the development of EPFL's new antenna in Fribourg, dedicated to the Smart Living Lab, an inter-institutional competence center dedicated to shaping the built environment for the future. And at EPFL Valais-Wallis in Sion, we see a great opportunity to strengthen and expand our competences in hydraulics and energy with other schools at EPFL and beyond, working together to address challenges related to sustainably securing our energy needs within a healthy environmental context.

I am particularly pleased to take the lead of the School at a time when its growth and sustainability are being discussed as key priorities, and to actively participate in shaping its future, recruit new forces, and embrace strategic opportunities, with the support and full commitment of a strong ENAC Direction that is dedicated to excellence both in research and teaching.

Marilyne Andersen, Dean of ENAC

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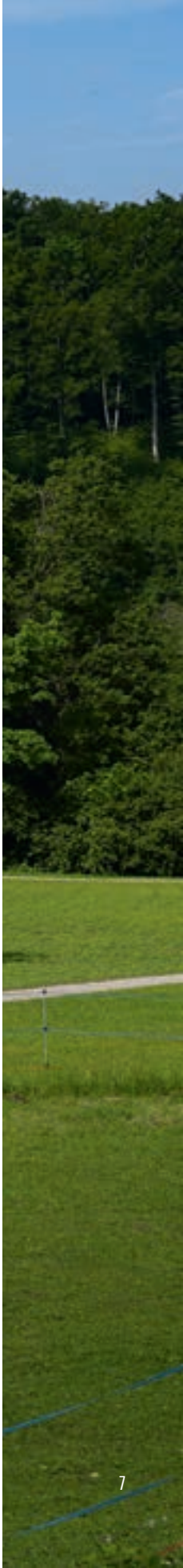
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HOME SWEET NURSING HOME



BRUNO MARCHAND EXPLAINS HOW
ARCHITECTS CAN MAKE NURSING HOMES
FEEL MORE HOMELY.



Bruno Marchand, Director
Theory and History of Architecture Laboratory 2 (LTH2)
<http://ltha.epfl.ch>



Nursing homes are complex hybrid organisms.

To architects, nursing homes are a tough nut to crack. Somewhere midway between homes and hospitals, they have to stimulate social contact and provide privacy, be wheelchair and stretcher compatible, yet cozy – and all that on a limited budget. Under a mandate by the canton's Public Health Department, Bruno Marchand and Marielle Savoyat analyzed a dozen nursing homes recently built in the Swiss canton of Vaud through the gaze of an architect. Their findings were published in a book that gives an overview of the history and current trends in the field of nursing home architecture. We sat down with Bruno Marchand to talk about some of the insights gained while writing the book.

Is architecture really that important for the quality of a nursing home?

Yes, obviously! We can safely assume that architecture is closely related to human behavior – even if there are contradicting theories on the subject. There are a number of issues that are inherent to architecture of nursing homes: comfort, atmosphere, and accessibility are fundamental to the wellbeing of elderly people, who are often in a fragile state of health.

What types of challenges do architects face when they design nursing homes?

Nursing homes are complex hybrid organisms, where areas for medical care are closely connected to residential areas. A major challenge is to give them a strongly humane character. Over the past years, those in charge of nursing homes have endeavored to make the medical component of the facilities as discreet as possible. The residents should feel like they are at home, not in a hospital.

Tell us about the book you just published.

Our mandate was to analyze a set of nursing homes that opened recently in the canton of Vaud from an architectural perspective. We studied both the initial conception of each project and its ultimate realization. Additionally, we analyzed hundreds of entries submitted to recent architectural competitions in order to uncover the breadth of possible approaches and thus provide architects with extensive documentation and a foundation upon which they can build when thinking on the subject. We also dedicated a chapter to a historical overview of nursing home architecture.



What makes a nursing home a good nursing home?

Basically, anything that conceals its institutional character. Long hallways are being increasingly replaced by circular ones to minimize a resemblance to hospitals. Rooms and associated elements, such as doors and windows, are given extra care. The entrance to rooms, which marks the transition between private and public – or intimate and collective – spaces, is another essential component. And location is crucial: we have to avoid building “secluded oases in the countryside” and instead integrate nursing homes into bustling neighborhoods that are well serviced by public transport and located near shops and restaurants. However, land at such prime locations is unfortunately hard to come by.





"We have to avoid building "secluded oases in the countryside" and instead integrate nursing homes into bustling neighborhoods that are well serviced by public transport and located near shops and restaurants."

Bruno Marchand

What are the most prevalent ways of designing nursing homes today?

When we analyzed the submissions for nursing home competitions, one theme that came out was that of a large house – about the size of a townhouse. Sometimes two rooms share a single window, and the windows are staggered to attenuate the institutional, regular nature of the building. Large establishments are often fragmented into several smaller structures.

Do other models exist?

In Basel, Herzog and de Meuron built a nursing home in a football stadium, provocatively stating that their residents like to watch football... There is no single model, which is what makes this book interesting. Despite these differences, the humanist discourse is becoming more and more prevalent, adapted each time to local cultural and financial circumstances.

How are things in Switzerland and particularly in Vaud?

Historically, Switzerland has been very mindful of the wellbeing of its elderly population and has therefore become one of the most advanced countries in this area. On top of that, there is a constant sense of progress, with each project bringing a new set of lessons. The members of the canton's Public Health Department play an important role in guiding these projects and making sure that they keep up with developments in the field.

Did you experience anything particularly fascinating during your research?

Moving into a nursing home is a difficult step in life, and it is fascinating to see how different people deal with this transition. Some leave behind their past and bring along nothing but their toothbrush. Others try to take their entire lives with them. Because space is limited, this can sometimes be challenging. But what I saw and heard when visiting the homes was generally very positive. Even in a small space, it is perfectly possible to live well.





BRAVING THE SHOCKS



SENSOR-BEARING BUILDINGS CRACK
AND CRUMBLE BEFORE CAMERAS
PROVIDING INSIGHT INTO EARTHQUAKE
RESISTANT DESIGN.



Katrin Beyer, Director
Earthquake Engineering and Structural Dynamics Laboratory (EESD)

<http://eesd.epfl.ch>



In 1356, Basel was hit by Central Europe's most destructive earthquake in modern history.

Earthquakes are not the first thing that come to mind when we think of Switzerland. But every 90 to 100 hundred years, experts estimate, the ground rumbles beneath the Swiss canton of Valais. The last such quake, a 6.1 on the Richter scale, struck in 1946, costing four lives and damaging about 3,500 buildings. In 1356, Basel, another Swiss seismic hotspot, was toppled by Central Europe's most destructive earthquake in modern history.

To prepare today's buildings to brave the shocks of the next big one, Katrin Beyer and her collaborators from ENAC's Earthquake Engineering and Structural Dynamics Laboratory went to Pavia, in Italy, where they built a four story building on a giant indoor shake-table. There, they flipped a switch and watched the building's structure crack and crumble under artificial shocks and after-shocks. During each artificial tremor, cameras tracked the motion of the building, while accelerometers and sensors monitored the forces exerted on the structure. And with each shake, the fissures grew deeper and spread across the masonry and concrete walls.

Earthquakes are so rare that it is almost impossible to run real-life tests in buildings when they occur in nature. At the same time, the propagation of the vibrations through their walls is so complex that today's computer models fail to capture them accurately. Nonetheless, engineers need to know how to design buildings and select materials to make them as safe as possible. Large-scale studies such as Beyer's provide valuable insights that can help guide anti-seismic building design.

Findings made on the shake-table are also essential to improve earthquake-response models of buildings, which according to Katrin Beyer, are still in their infancy. "Today, in seismic design the building's response to an earthquake is analyzed by modeling it as a heavy ball on a stick. The ball represents the building's mass and the stick's properties account for the stiffness of its walls," she says. Engineers rely on this "lollipop" model to make recommendations on construction materials and wall strengths needed to guarantee the safety of a building in what would be considered a large earthquake where the building is constructed.

Until 1989, buildings in Switzerland were constructed with little or no regard to seismic hazard. To make them meet today's heightened construction standards, in vigor since 2003, old buildings are being upgraded and all new buildings are designed to guarantee the survival of their inhabitants in earthquakes with an estimated return time of 475 years. That means that buildings in earthquake-prone Valais have to be designed to resist much stronger shocks than in Geneva, where the seismic risk is much lower. According to Katrin Beyer, over a period of fifty years the odds for a stronger earthquake to occur are about one in ten.

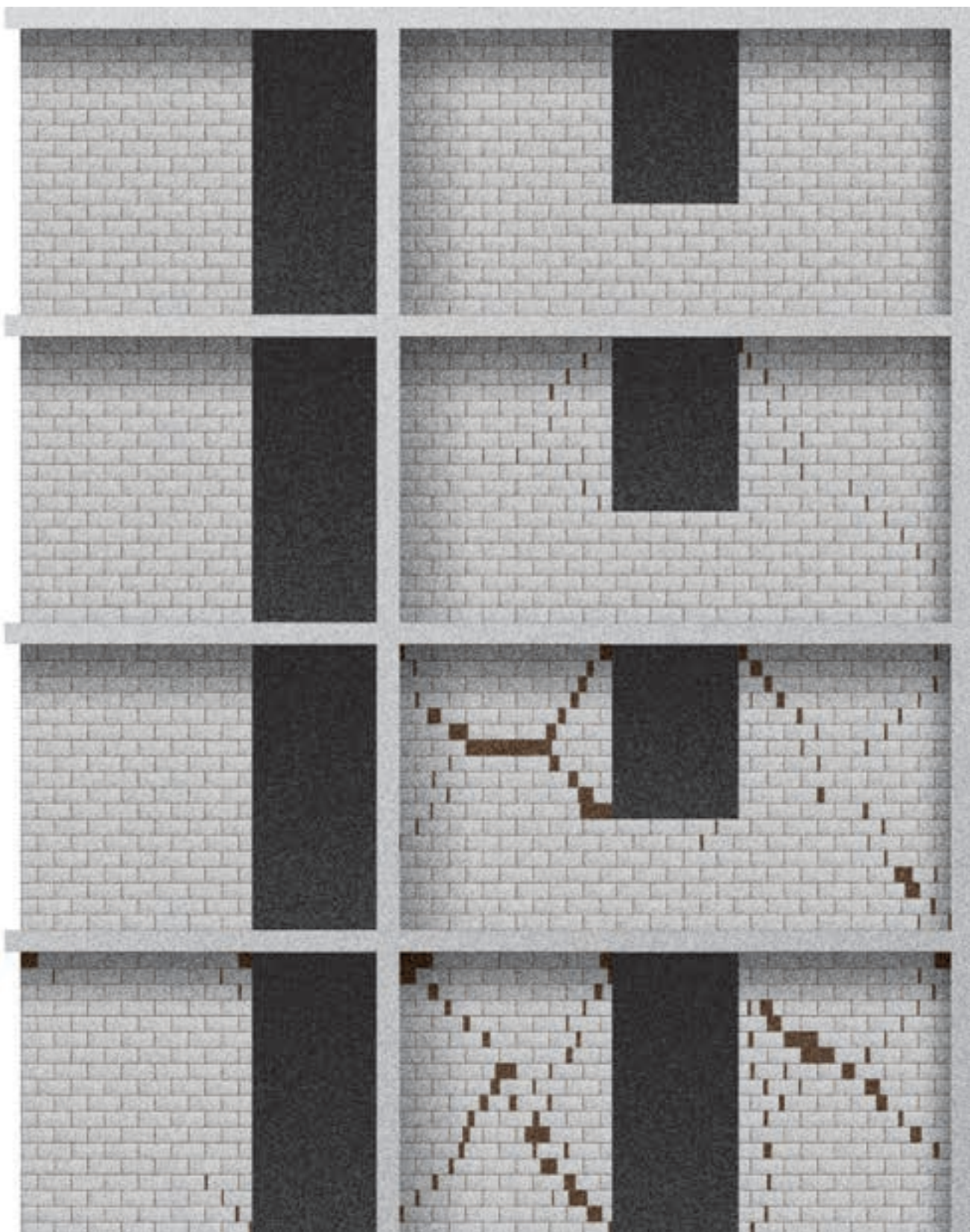
Many current design recommendations, says Beyer, are based on overly simplistic assumptions. "Today, existing masonry buildings are being strengthened by incorporating stabilizing reinforced concrete walls into their structure. These walls are designed using the ball and stick model, where the masonry walls are left out altogether, leading to inaccurate results" she says. "The true overall behavior of the buildings depends on both types of walls – and especially on the way they interact."

"The next stop will be to assess each building individually using more accurate computer models."

Katrin Beyer

The tests carried out in Italy were the first to be conducted at such a large scale on mixed structures, composed both of masonry and concrete walls. Eventually, the outcome should improve guidelines for the construction of new buildings and the stabilization of existing ones.


"The next stop would be to assess each building individually using more accurate computer models," says Beyer. But even then, 100% safety cannot be guaranteed. Buildings are always designed to resist most earthquakes in a given region. Yet an exceptionally strong one could still bring them to a fall.





SIMILAR,
YET UNIQUE





JACQUES LEVY PAINTS A
CINEMATOGRAPHIC PORTRAIT OF CITIES,
WEAVING TOGETHER IDEAS FROM ITALO
CALVINO'S "INVISIBLE CITIES" AND
IMAGES CAPTURED IN THE REAL WORLD.



Jacques Lévy, Director
Chôros Laboratory (LAC)

<http://choros.epfl.ch>

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Cities are the most productive way of bringing people together.



Most researchers publish their findings in journal articles, books, or reports. Instead, Jacques Levy decided to present his findings in a film, where he constructs a dialogue

between the famous Italian writer, Italo Calvino, and his own scientific discoveries. In “Invisible Cities,” Italo Calvino has Marco Polo describe 55 cities that he visited to the great emperor Kublai Khan. Levy’s project draws on a range of themes touched on by Italo Calvino, such as trade or memory. His manifesto builds on a patchwork of sequences filmed in numerous Chinese cities and photographs taken across the four corners of the globe over a period of almost 13 years.

How do you look at cities in your film?

Cities are the most productive way of bringing people together. They are a concentrate of everything that exists in a society, both banal and extraordinary, always hiding something new, something unexpected. We feel comfortable in cities. We know how they work. But merely walking through a city, we are often caught between a feeling of surprise and one of being at home. What I found interesting in the research that led up to this film was the relationship between the singularity of each individual city and the increasingly standardized concept they are built upon.

What is behind this unifying aspect?

In a way, the same causes lead to the same effects. For instance, every city needs a transportation network to connect the different neighborhoods. Consider the subway line in New Delhi. It’s fascinating to see how the residents

force themselves to wait for the passengers exiting the metro to do so before they embark. In a society where the notion of public property is only weakly present, where other people are hardly considered if they are strangers, and where the idea of urban discipline is still rather vague, this subway is somewhat the antithesis of Indian cities. A kind of self-conditioning is taking place, and you can tell that they are in the process of learning. New Delhi’s subway line is unique in that it is New Delhi’s subway line, but at the same time, it is a lot like any other subway on the planet.



What is the connection to literature?

Cities are a genre, in the same way that detective stories are a literary genre. They all follow the same rules. But the beauty of the genre arises from variation within these rules, where creativity is constrained, but present nonetheless.

And why use cinema to carry this message?

I did not aim to make a popular film, but rather to understand specifically how video could contribute in a project that is based on the same principles as the work leading up to any other scientific publication. Here, the premise is to strengthen the viewer's lucidity, rather than weakening it. A commercial fictional film is formatted for a certain type of reaction. In the spirit of research, the opposite has to be the case. Readers, or the audience, always have to be in a position that lets them criticize or refute the work. That means that we have to keep them awake, not put them to sleep.

**Why did you choose to cite Calvino?**

Italo Calvino's writings I've read and re-read over and over again. He is one of the reasons behind my desire to study cities at a deeper level, not only as a theoretical object. I feel strongly in tune with his approach, not only at the interface between science and art, which have to be considered as two distinct entities, but also in assuming that there are hybrid zones, in which the researcher is concerned with aesthetics and the artist with knowledge. For me, "Invisible Cities" by Calvino is a general treatise about cities. I tell my students that it is the best treatise on urban geography and that, to this day, I cannot offer them anything better in the scientific domain.

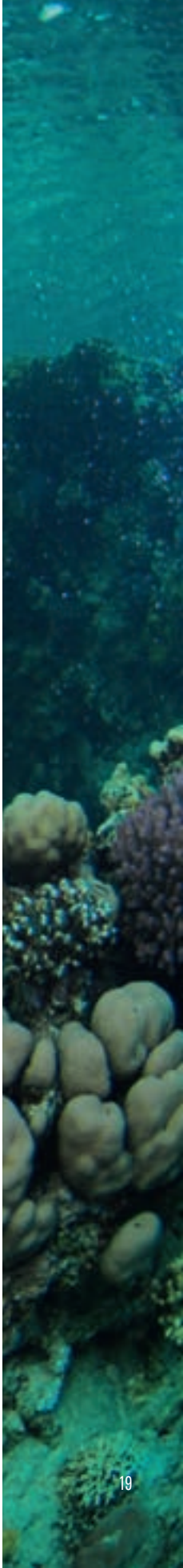


"Italo Calvino's work is behind my desire to study cities..."

Jacques Lévy



FEEDING CORALS



RECENT RESEARCH BY ANDERS MEIBOM
REVEALS THAT CORAL-DWELLING ALGAE
MAY DRAW ON TINY CRYSTAL SILOS TO
“PAY THEIR RENT.”



Anders Meibom, Director
Laboratory for Biological Geochemistry (LGB)

<http://lgb.epfl.ch>



The algae can stock up on nutrients when supply is abundant to “pay the rent” when it is low.

From behind his standing desk, Anders Meibom points at an image on his computer screen. “See that little dot right there that looks like a grain of salt?” he says. “That’s a uric acid crystal, one of nature’s most compact ways of storing nitrogen.” The crystal is just one of many that are visible inside a roundish single-celled organism – an algae of the kind that dwells inside corals, giving them their colors. Each of these crystals acts as a tiny silo, storing vital nutrients that the corals can draw on when nitrogen levels in the surrounding seawater drop.

“Coral reefs are the jungles of our oceans - hotspots of biodiversity unparalleled by other marine ecosystems,” he says. But exactly how the corals and the algae they host interact with each other and exchange food has long remained shrouded in mystery. Last year, for the first time, scientists at EPFL were able to track nutrients as they are taken up by the organisms and literally watch them process and share the food among themselves.



The images on Meibom's screen were made possible thanks to a new generation of ion microscopes called a NanoSIMS. Written out, it is a mouthful: a Nano Secondary Ion Mass Spectrometer, but its name carries the weight of the many scientific doors it opens. Thanks to the NanoSIMS he operates, Meibom has become one of few scientists around the world able to track the very building blocks of matter – individual atoms – as they assemble to form both living and lifeless structures.

“Basically, the NanoSIMS is a fancy microscope that is able to map the chemical and isotopic composition of just about anything solid, including biological tissue,” explains Meibom. It does so by bombarding the sample with a beam of ions – charged particles – one nano-scale spot at a time. The incoming ion beam dislodges charged particles in the sample, much like a high pressure cleaner dislodges dirt. But rather than being ejected randomly, the ionized particles from the sample form a second ion beam.

Next, this secondary beam is channeled into a magnetic chamber, where the individual ions are separated by mass. The magnetic field bends their flight paths, forcing them to turn like cars exiting a freeway. But because of inertia, heavier ions take a wider curve than light ones. Up to seven detectors can be set up as nets to catch, identify, and count the ions as they exit the chamber.

In the NanoSIMS community, Meibom's research group stands out because of its focus on biology. “Most researchers use the NanoSIMS to study the composition of geological samples, such as meteorites. We found our niche studying microbiological processes as they take place,” he says.



“Coral reefs are the jungles of our oceans - hotspots of biodiversity unparalleled by other marine ecosystems.”

Anders Meibom

To find out how algae and their coral hosts take up food, a team of researchers led by Meibom grew the organisms in an aquarium and fed them with nutrients that were modified to be heavier than their natural equivalents. Nitrogen becomes heavy nitrogen; carbon becomes heavy carbon, and so on. After a short feed, they drew samples from the aquarium at regular time intervals and prepared them for analysis by slicing them into microscopically thin slices. Using the NanoSIMS, they were then able to determine exactly where the heavy nutrients had been incorporated into the cells.

Their findings, published last year in the journal *mBio* earned first author Christian Kopp a prestigious award, and shed light on some poorly understood aspects of the relationship between these tiny algae and their coral hosts, revealing that the corals depend strongly on the algae to extract sufficient nutrients from the water. This was particularly true when the corals were exposed to nitrate, a compound that they are unable to process and assimilate on their own.

But most interestingly, the scientists observed that the algae act as tiny food banks. Their NanoSIMS images showed how the algae temporarily store the nitrogen in the form of uric acid crystals. This way, they can stock up on nutrients when supply is abundant and draw on them when supply drops, effectively “paying the rent” to their coral host





RESEARCH HIGHLIGHTS

In our laboratories, some 75 investigators and their groups are advancing knowledge in the most challenging areas of architecture, civil engineering and environmental engineering research today. Highlighted here is a sampling of some of the research conducted in 2013. To learn more about the latest research by ENAC scientists, visit <http://enac.epfl.ch/research>

UNDERGROUND CONSTITUTION DEEP URBAN (SWITZER)LAND

As a natural source of resources, space, and protection from the elements, the ground beneath our feet could become the next frontier of territorial development. In a one-year research project, students and researchers at LABA, Professor Harry Gugger's Basel-based architecture research lab, are focusing their attention onto this vast, yet relatively neglected resource.

Deep Urban (Switzer)land focus on multiple levels. Besides taking stock of the potential uses of the subsurface, it proposes regulations to legislate its exploitation, based primarily on existing groundwater conservation laws. The project also addresses many of the fundamental challenges architects and urban planners face in this largely unused space, which calls into question some of the most basic notions, such as inside and outside, public and private.

Lessons learned in the first semester of the project were compiled into a territorial constitution for the underground, intended to guide and promote its sustainable development. With mounting demographic pressure to expand urban areas confronted with legal demands to rein in urban sprawl, a careful exploitation of the subsurface could offer some relief.

Prof. Harry Gugger

EPFL Laboratory Basel (LABA)

<http://laba.epfl.ch>



LOCAL ANSWERS TO THE URBAN CHALLENGE

Although cities are home to more than half of the world's population, views continue to diverge on how to design vibrant and resilient urban neighborhoods. In a book by Elena Cogato Lanza, Luca Pattaroni, and co-authors, published by MetisPresses, the authors turn to Grottes, a decidedly alternative neighborhood located north of Geneva's main railway station, to seek insights on urban issues that weigh on cities the world over.

De la différence urbaine is a portrait of a neighborhood that, throughout its history has affirmed its uniqueness, allowing it to evade modernization in the 1970s and evolve largely according to its own terms to this day. This very uniqueness – its emphasis on urban mixity, the appropriation of outdoor spaces, and remarkable social cohesion – makes it an informative and increasingly relevant case study for alternative approaches to urban design.

This body of work, a collaboration between EPFL and the *Fondation Brillard Architectes*, refreshes the tools used to study urban phenomena from a socio-architectural perspective, revealing both their qualities and their contradictions.

De la différence urbaine – Le quartier des Grottes

Elena Cogato Lanza, Luca Pattaroni, Mischa Piraud, Barbara Tirone. Genève, ISBN: 978-2-94-0406-5-00

Elena Cogato Lanza

Laboratory of Urbanism (LAB-U)

<http://lab-u.epfl.ch>

Luca Pattaroni

Urban Sociology Laboratory (LASUR)

<http://lasur.epfl.ch>

SHEDDING EXCESS WEIGHT WITHOUT LOSING THE CURVES

Curved concrete surfaces are making a comeback in contemporary architecture – EPFL's Rolex Learning Center is one example of this trend. But to this day, engineers designing them are faced with a conundrum: optimizing their dimensions for maximal performance. Marie-Rose Backes is studying the non-linear behavior of curved concrete structures to improve the tools used to dimension concrete vaults and shells.

The stability of curved concrete structures depends on the complex interplay between their geometry and their material composition. While a too thin layer of concrete will produce a structure unable to resist its own load, the same is true for an overweight structure. Furthermore, subtle changes in a structure's geometry can have disproportionate effects on its material requirements.

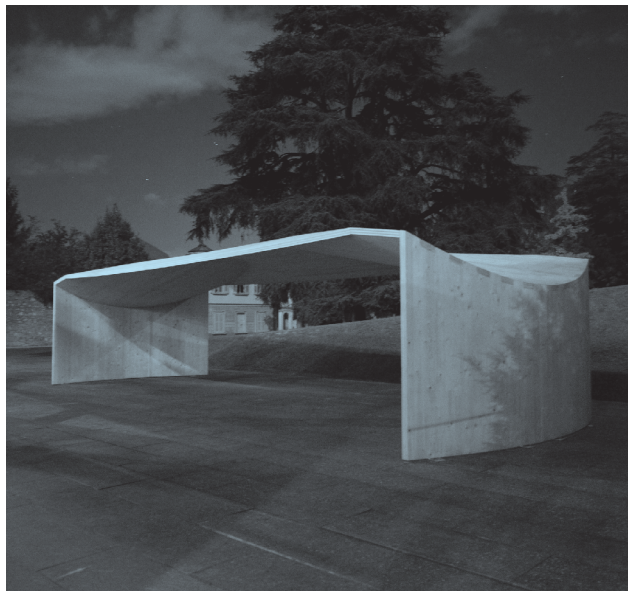
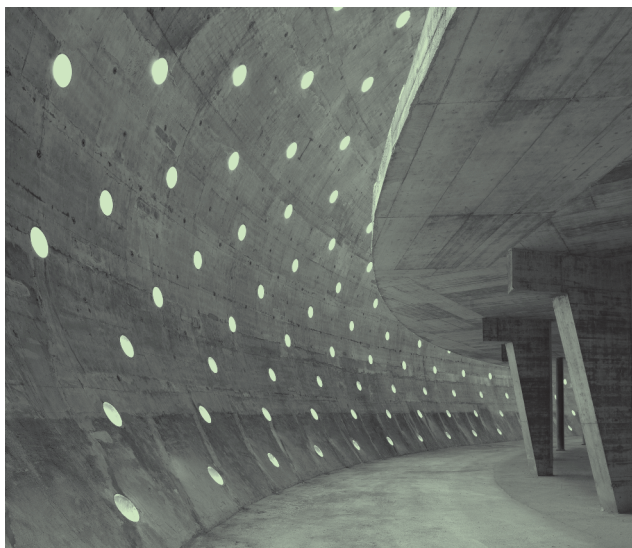
The computer models engineers use today to simulate forces in structures work well on elastic materials, but reach their limits when applied to materials with non-linear properties, such as concrete. Improved models will not only allow engineers to build safer, more robust structures. By optimizing the geometry of the structure, they will also help save construction materials.

PhD Thesis currently underway

Prof. Aurelio Muttoni

Structural Concrete Laboratory (IBETON)

<http://ibeton.epfl.ch>



NEW APPLICATIONS FOR TRADITIONAL JAPANESE WOOD JOINERY TECHNIQUES

Due to its sustainability, timber is becoming increasingly popular as a building material. This has re-sparked an interest in its use for the design of shell and spatial structures that benefit from the lightweight material's high strength and the ease with which geometrically complex components can be machined using automated fabrication technology. For his thesis, Christopher Robeller developed new machine-fabricated line-joints to connect wooden folded-plate thin shell structures.

These joints are critical for the realization of wooden folded plate structures, inspired by the Japanese art of Origami paper folding, a construction approach that has been extensively studied at IBOIS, the ENAC's Laboratory for Timber Construction. Load tests conducted at IBOIS have shown that the loading capacity of such structures could be significantly improved by replacing state-of-the-art steel connectors with the more resistant wooden line-joints.

The technique was recently exploited for a wooden pavilion designed by IBOIS for the Mendrisio University gardens, a shell-shaped structure composed of curved and cross-laminated timber panels.

PhD thesis under way

Prof. Yves Weinand

Chair of Timber Construction (IBOIS)

<http://ibois.epfl.ch>

RESEARCH HIGHLIGHTS

TYING IN THE PERIPHERY

By reducing travel times to distant suburbs, public transportation services could incentivize citizens to move out of the city center into the periphery. So to what extent does more efficient public transport infrastructure promote urban sprawl? The Federal Transportation Office put this question to researchers at CEAT, the Urban and Regional Planning Community.

Mandated to focus on the situation in Zurich, where an extension to the city's light-rail network could increase the accessibility of the more distant periphery by public transport by significantly reducing travel times, the CEAT-led study responded with a resounding "Yes, but..." While it found that the extension was likely to lead to changes in the choice of transportation mode and to higher land prices in the vicinity of the light-rail stations, the high land prices and restrictive urban development plan in the Canton of Zurich would predominately lead to increased urban development in neighboring cantons.

Pierre Dessemontet, Sandra Walter, André Ourednik, Vincent Kaufmann. Etude sur les effets spatiaux du développement de l'offre dans le domaine du transport régional de personne. Analyse du projet de S-Bahn 26 sur le Canton de Zurich (French), 01.04.2014, Federal Office of Transport FOT

Dr Jérôme Chenal
Urban and Regional Planning Community (CEAT)
<http://ceat.epfl.ch>



RETHINKING AVIATION: TRAVEL ONBOARD A FLYING TRAIN

Board a train in Lausanne and travel to Tokyo without leaving your seat. With the Clip-Air concept, this could one day become feasible. In June 2013, Claudio Leonardi presented Clip-Air at the Paris Airshow in Le Bourget, France, eliciting a phenomenal response in the press.

This new aviation concept, whose development is coordinated by EPFL's Transportation Center, brings the flexibility of rail-transport to aviation by decoupling the aircraft's wing and cockpit from its up to three capsules, which can carry either passengers, fuel, or freight. As a result, it could bring relief to airports operating near capacity, increase passenger and flight crew security, and minimize the number of empty seats.

With financial support from EPFL Middle East, a PhD thesis by Bilge Atasoy has helped clear a first set of feasibility studies. The project's authors are now planning more in-depth tests on a flight simulator and the design of a six-meter prototype to assess the flight performance of the flying wing.

Bilge Atasoy. Integrated supply-demand models for the optimization of flexible transportation systems, EPFL PhD Thesis 5981, 2013

Bilge Atasoy, Matteo Salani, Michel Bierlaire and Claudio Leonardi. Impact analysis of a flexible air transportation system, European Journal of Transport and Infrastructure Research 13(2): 123-146, 2013

<http://clipair.epfl.ch>

Prof. Michel Bierlaire
Transportation and Mobility Laboratory (TRANSP-OR)
<http://transp-or.epfl.ch>

THE FATE OF ALGAE IN SILVER CONTAMINATED FRESHWATER

Silver nanoparticles have become commonplace in many applications – as ingredients in cosmetics, food packaging, disinfectants, and functional clothing. Although the bulk of silver nanoparticles is retained in wastewater treatment plants, only little is known about the persistence and the impact of the residual nano-silver in the environment.

To understand how an algal cell responds when it encounters silver contaminated water, Kristin Schirmer, joint professor between Eawag and EPFL, and her team developed a comprehensive mechanistic model of the response of an algal cell to silver. They observed that even non-lethal concentrations significantly stunted photosynthesis and growth, and that the cells mounted a complex response to the stress, which they were able to largely overcome in all but the highest studied pollutant concentrations.

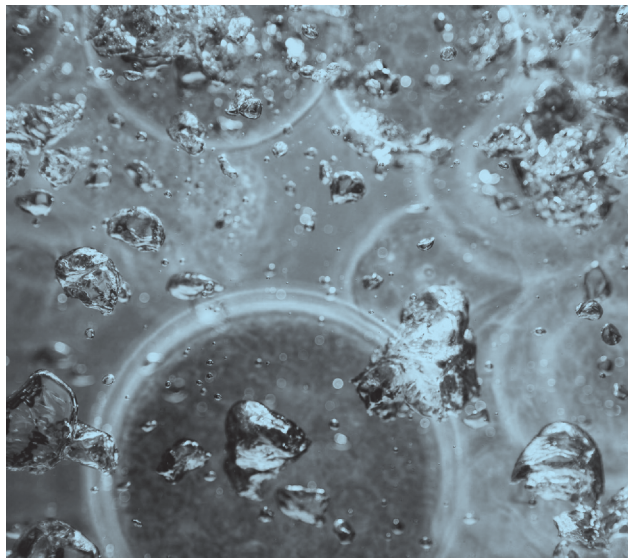
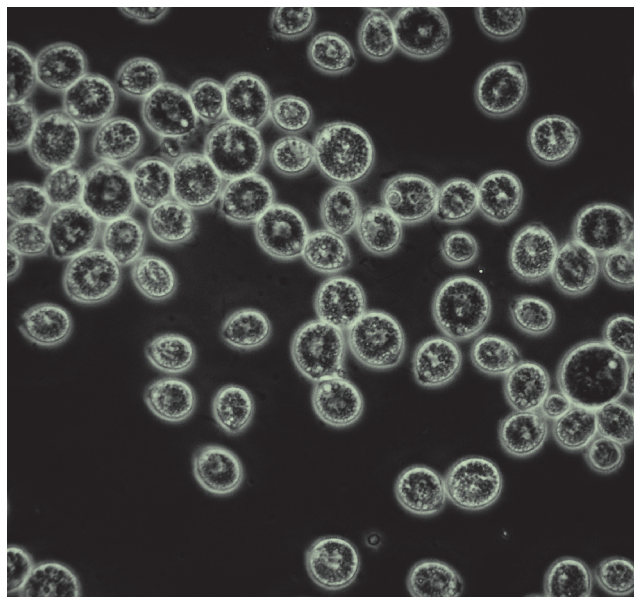
Their findings revealed a certain resilience of the cells to silver exposure but raised concern about the transfer of the contaminant through algae into the aquatic food chain.

Smitha Pillai, Renata Behra, Holger Nestler, Marc J.-F. Suter, Laura Sigg and Kristin Schirmer. Linking toxicity and adaptive responses across the transcriptome, proteome, and phenotype of *Chlamydomonas reinhardtii* exposed to silver; *Proceedings of the National Academy of Sciences (PNAS)* – early edition 18. February 2014

Prof. Kristin Schirmer

Laboratory of Environmental Toxicology (TOX)

<http://tox.epfl.ch>



A FAST TRACK FROM ALGAE BIOMASS TO BIOGAS

It took nature millions of years to transform biomass into coal, oil, and natural gas – the fossil fuels we rely on today. Researchers at the Paul Scherrer Institute and EPFL are fine-tuning a chemical process that rapidly converts microalgae into a methane-rich bio-fuel that is compatible with today's distribution grid and can power a wide range of applications from power plants to cars.

Their approach integrates the culture and harvesting of microalgae and the gasification of the wet biomass into the final product: synthetic natural gas. By running the process in a closed loop, they are able to further increase the sustainability of their approach by continuously reusing water, CO₂, and nutrients to grow the microalgae.

Further bringing down the production costs will be critical to making this approach a viable alternative to today's fossil fuels. In a recent publication, Martin Brandenberger and his collaborators showed that, although growing the algae in photobioreactors produced less energy for each unit of energy invested, the resulting biogas could be more affordable than that produced using algae grown in raceway ponds.

Martin Brandenberger, Julian Matzenberger, Frédéric Vogel, and Christian Ludwig. Producing synthetic natural gas from microalgae via supercritical water gasification: A techno-economic sensitivity analysis, *Biomass and Bioenergy*, Volume 51, April 2013

Prof. Christian Ludwig

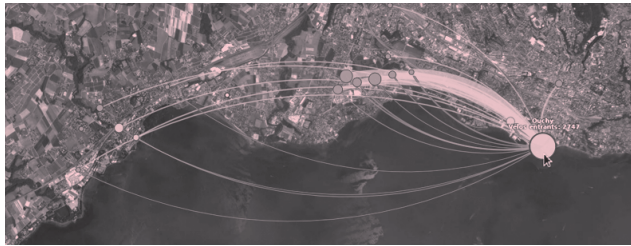
EPFL-PSI Joint Professorship on Solid Waste Treatment

<http://cpm.web.psi.ch>

ENAC AT LARGE

SMART MAPS FOR SMART CITIES

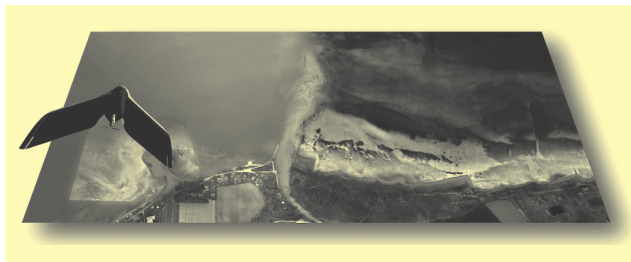
Citviz is spin-off from ENAC's Laboratory for Geographical Information Systems (LASIG), founded in 2012. CEO Nicolas Lachance-Bernard saw a niche in developing what they call an urban intelligence computing and geo-visualization ecosystem to intelligently gather information to support decision-making. In 2013, Citviz released an open source GIS application that allows researchers to organize, mine, and analyze geo-localized information. Since it was first conceived in 2007, the technology has been tried and tested in research projects across Europe, the United States, and the Middle East.



www.citviz.com

AN EYE IN THE SKY THAT SEES THE INVISIBLE

In 2013, Yosef Akhtman, a post-doc at ENAC's Laboratory for Geodetic Engineering (TOPO), founded VISNX, a startup seeking to commercialize miniature hyperspectral imaging sensors. This burgeoning remote imaging technology lets researchers decompose and analyze light across 250 distinct wave lengths, a major step up from the three channels nature has provided us in our eyes. Cameras developed by VISNX are optimized for integration on small unmanned aircraft systems to be used in environmental monitoring and precision farming applications. In 2014, before this report went into print, VISNX won the first two rounds of venture kick's financing process: 30,000 CHF of pre-seed capital that should provide the start-up with the means of further developing the project and pursuing the competition in its final, third stage.



A TOUCH OF COLOR FOR SOLAR PANELS

In 2012, EPFL's Laboratory for Solar Energy and Building Physics patented a method that uses nanotechnology to make solar panels more visually appealing by concealing them behind glass panes with a colored glazing. Research towards the commercialization of the technology was pursued by EPFL spin-off SwissINSO, who patented a nano-deposition process to produce the colored panels. In late 2013, Emirates Insolare was founded as a joint venture between SwissINSO Holding and Glass LLC, bringing the technology to the United Arab Emirates, where it will be produced in the new, state-of-the-art production facilities.



www.swissinsol.com

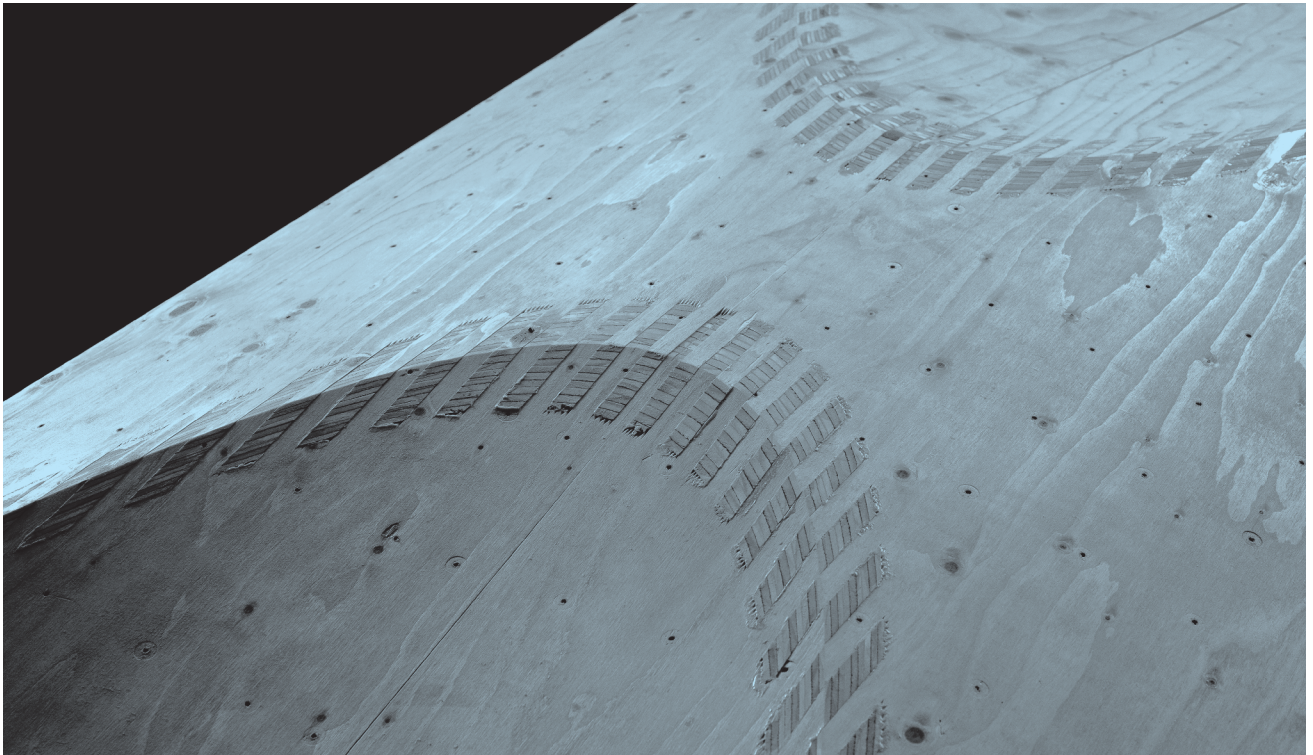
ARCHITECTURAL PRODUCTION AUTOMATED

As part of an NCCR in digital fabrication for construction, ENAC's Laboratory for Timber Construction will be developing ways to make robots do more than just the heavy lifting on construction sites.

In the same way that technology revolutionized the consumer goods industry in the past decades, it could also transform the way that buildings are built. The National Center for Competence in Research (NCCR) in Digital Fabrication, launched in late 2013, seeks to speed up developments in advanced construction processes in architecture that use computational tools and robots to build better and safer buildings, while saving time and money. Over 13 million Swiss francs have been put behind the project, which aims to consolidate and expand efforts by Swiss research institutions in a variety of fields, ranging from architecture and materials science to robotics and computer-aided design.

EPFL's Chair of Timber Construction (IBois) is one of 13 laboratories to participate in the NCCR, which will be hosted by ETH Zurich. Having gained international recognition for its innovative approach to designing structures using woven sheets of timber, IBois will provide its expertise in structural mechanics, architecture, and digital fabrication through three PhD projects focusing on computational design and building processes, material and constructive systems, and robotic control and fabrication.

Under the supervision of Yves Weinand, the director of IBois, the researchers will develop a computational framework to optimize the structure of buildings and use computer modeling to predict the behavior of materials they are composed of. They will seek new ways to connect timber elements and automated approaches to integrate the joints into the timber elements themselves.



ARCHIZOOM

ARCHIZOOM, ENAC'S PERMANENT EXHIBITION GALLERY, IS DEDICATED TO THEMED PUBLIC EXHIBITIONS OF RESEARCH AND PROJECTS ACCOMPANIED BY SEMINAR SERIES, WITH THE GOAL OF ILLUSTRATING THE MULTIDISCIPLINARY ASPECTS OF ARCHITECTURE.

In 2013, art, engineering, and architectural instruction were the topics of Archizoom's conferences and exhibitions.

In the spring, "Hall of Mirrors" presented Swedish artist Jonas Dahlberg's body of work. A series of videos filmed inside reduced-scale models of spaces reproduced the mental images that we create of the spaces we occupy. In parallel, Danish artist Olafur Eliasson was invited to hold a conference organized in collaboration with Afrotech, EPFL's Future Africa Initiative.

Civil engineering was next to be honored with a historical exhibition on Pier Luigi Nervi, the Italian engineer. To mark the occasion, Alberto Bologna, Cyril Veillon, and Aurélio Muttoni assembled a conference series on the theme of some of the great structural engineers of the 20th Century. The speakers presented the works of Pier Luigi Nervi, Eduardo Torroja, Ildefonso Sánchez del Río, Félix Candela, Riccardo Morandi, Eladio Dieste, and Robert Maillart. An international workshop organized by the Laboratory of Techniques and Preservation of Modern Architecture (TSAM) brought together a number of experts in the restoration of the great engineering projects of the past century.

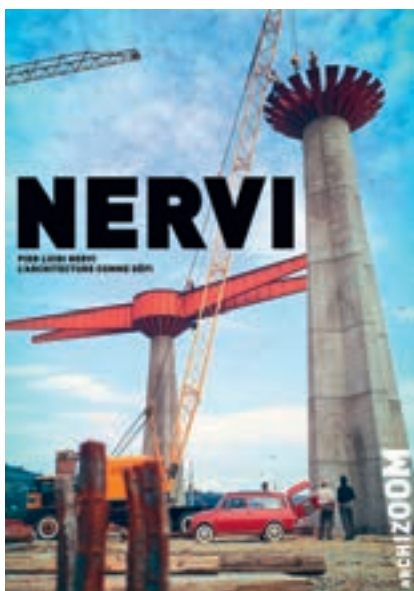
During the autumn semester, an exhibition entitled "*Ville Ouverte – Penser en Construisant*," French for "Open City – Thinking by Building," presented the experimental teaching approach adopted by the Chilean architecture school EAD PUCV, in which students work in groups to build full-scale models of structures. This approach was adopted by students from EPFL, the EAD, and ETHZ during a workshop organized



with the Chilean professors who had been invited to Lausanne. Beatrix Colomina held a conference on radical teaching methods in architecture from the 1950s to the 1970s. Udo Thönnissen presented experimental workshops carried out at ETHZ, and Patrick Bouchain showcased architectural achievements by his agency that were based on collaborative initiatives.

The year ended on a conference by Japanese architect Kengo Kuma, who, among others, presented *Under One Roof*, the new pavilion that will soon be built at EPFL.

Archizoom also organized an architectural competition for students on the transformation of the entrance of the SG building into an emblematic site on campus. The competition was enthusiastically met by the students, who participated in large numbers.



ARCHIZOOM

EPFL — Building SG — Station 15
1015 Lausanne
Exhibition Room SG 1212 — Entry free
+41 (0) 21 693 32 31
<http://archizoom.epfl.ch>

Events since 1974:
<http://archizoom.epfl.ch/archives>

LANDOLT & CIE SA CHAIR

INNOVATIVE STRATEGIES FOR A SUSTAINABLE FUTURE

In its sixth year, the Landolt & Cie Chair welcomed Professor Philip G. Jessop from Queen's University in Ontario Canada to spend the 2013-2014 academic year at EPFL. Jessop is an expert in green chemistry, a branch of chemistry that focuses on replacing dangerous or polluting chemicals, such as certain solvents used in the industry, with safer and cleaner alternatives.

Jessop's commitment to the promotion of green chemistry extends beyond his academic work, through his involvement in GreenCenter Canada, a not for profit organization that commercializes innovations in the field of green chemistry. During his sabbatical year at EPFL, Jessop collaborated with Paul Dyson and Gabor Laurenczy from the school of basic sciences.

TWO PUBLIC LECTURES WERE HELD IN 2013

26.03.2013: Professor Raymond S. Bradley, director of the Climate System Research Center at the University of Massachusetts, Amherst, shared both his scientific expertise as a leading climate researcher and his personal experience as a target of a politically motivated campaign to tarnish his scientific reputation. His compelling lecture, entitled "The Fierce Urgency of Now," highlighted the need for leadership at an international level, in order to adopt an environmentally sustainable way of life and lift vulnerable populations out of poverty.



16.10.2013: The second public lecture held in 2013 focused on the oceans crossed by Bernard Stamm on his IMOCA sailing boat during the Vendée Globe 2012 race around the planet. Pierre Landolt, the sponsor of the Landolt Chair, and Bernard Stamm, the skipper of the IMOCA, joined EPFL Vice President Philippe Gillet and Pascal Vuillomenet, project manager, to discuss the motivations, technological challenges, and scientific questions that gave rise to the collaboration, as well as the difficulties encountered during the journey.

LANDOLT
& CIE SA

EPFL — Building GC — Station 18
1015 Lausanne/Ecublens
+41 (0) 21 693 20 44
<http://chaire-landoltetcie.epfl.ch>

CHAIR GAZ NATUREL PETROSVIBRI

GEOENGINEERING AND CO₂ STORAGE

The Chair “Gaz Naturel” – Petrosvibri, founded in 2012, integrates its state-of-art research expertise in the laboratory, using numerical simulations, and in the field to understand the geomechanical processes related to geological carbon dioxide (CO₂) sequestration. In-depth studies of the complex interactions that occur between the gas and its underground deposit are crucial to maximize the safety of carbon dioxide injection.

In 2013, the Chair’s activities involved developing computer models and conducting laboratory experiments to investigate the impact of injecting CO₂ at high pressures and temperatures into underground reservoirs, in particular focusing on the mechanical response of the host reservoir and its overlying geology.



EPFL — Building GC — Station 18
1015 Lausanne
+41 (0) 21 693 23 15
<http://chaire-gaz-naturel.epfl.ch>



MARGARETHA KAMPRAD CHAIR

LIMNOLOGY AND ENVIRONMENTAL SCIENCE

Having investigated the depths of Lake Geneva with submarines in 2011, Swiss and Russian scientists are turning to the sky above it in the Léman-Baikal project, launched in 2013. The study uses ultra-light aircraft equipped with state-of-the-art imaging technology to assess and compare the state of the Lake Geneva and Lake Baikal from a height of approximately 1000

meters. Hyperspectral cameras capable of separating the light spectrum into more than 250 different signals let the researchers gather an unprecedented amount of data on the properties of the lake water, and other sensors that allow visualizing the turbulence in the atmospheric boundary layer above it. The first field campaign was carried out above Lake Baikal in July 2013.

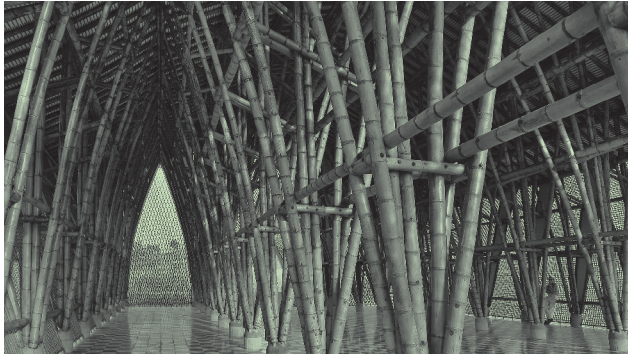
EPFL — Building GR — Station 2
1015 Lausanne
+41 (0) 21 693 63 92
<http://aphys.epfl.ch>

KEY MOMENTS

ENAC's public relations activities promote the school's research and teaching activities to the outside world and bring valuable feedback from institutions, future students, lecturers, researchers, political bodies and professional associations.

BAMBOO ARCHITECTURE ON DISPLAY

During the summer, Rossinière become the host of an unconventional architectural exhibition. Photographs of structures designed by bamboo architect Simon Velez were on display, curated by EPFL professor Pierre Frey, the author of a recent monograph on the pioneering Colombian architect. Due to its abundance in many parts of the world and its high strength to weight ratio that outperforms even steel, bamboo has established itself as a versatile and sustainable construction material. Simon Velez's portfolio includes bamboo churches, bridges, and a palette of other structures.



EXPERIMENTS IN DENSIFICATION

Working under the assumption that cities on the shores of Lake Geneva will soon merge into one large multi-polar metropolis, Andrea Bassi had his students imagine how this densification could affect the historic town of Caux, just North of Montreux, by adding 20,000 square meters of built surface without breaking out of its perimeter. The 20 projects that emerged from this experimental study, including residential, commercial, and office buildings, were on display last summer at Caux-Expo. This study is one in a series of experimental studies that focus on the densification of a range of surprising sites around Lake Geneva.



THE 2013 MECHANICS DAYS AT THE WIRE LAB

ENAC's new wind tunnel, designed and hosted by the WIRE lab, took center stage during the 2013 Mechanics Days. The annual event brought together PhD students from across the Mechanical Engineering Doctoral Program (EDME) for a visit of this new state-of-the-art experimental facility that was designed in-house to meet the researchers' specific needs. During the event, students attended a lecture by visiting professor Charles Meneveau, a recognized expert in fluid mechanics and turbulence from John's Hopkins University, who then went on to attribute the 2013 EDME award to former PhD student Dr. Nicolas Andreini for his research.

SAMPLING OF INTERNATIONAL EVENTS ORGANIZED BY OUR SCHOOL'S LABORATORIES

8-15/1/2013

Homegrown Neighborhoods — a Workshop on Urban and Social Development Processes in Mumbai, Mumbai, India — LASUR

30/5-1/6/2013

Eighth Workshop on Discrete Choice Models, EPFL, Lausanne — TRANSP-OR

25-27/3/2013

International Workshop on Thermoactive Geotechnical Systems for Near-Surface Geothermal Energy, EPFL, Lausanne — LMS

6-8/6/2013

First International Conference on Rock Dynamics and Applications (RocDyn-1), EPFL, Lausanne — LMR

10-11/6/2013

EuroTech GreenTech Workshop at EPFL on Energy Efficient Buildings, EPFL, Lausanne — LIPID

17-21/6/2013

IUTAM Symposium on Materials and Interfaces Under High Strain Rate and Large Deformation, Metz, France — LSMS

15/6-11/8/2013

Exhibition of Projekt LeGrutli Flotte in the Leewasser Gallery, Villa Flora Park, Gersau — LABA

21/8-20/9/2013

URBAN LAKESIDE - Public Exhibition at the Town Hall of Yverdon-les-Bains, Yverdon-les-Bains — LAST

5-16/9/2013

Taller Ciudad Abierta, Valparaiso-Lausanne, EPFL, Lausanne — ARCHIZOOM

4-6/9/2013

CISBAT 2013 — Cleantech for Smart Cities and Buildings — From Nano to Urban Scale, EPFL, Lausanne — LESO-PB

30/6-22/9/2013

Outdoor Exhibition on Bamboo Architect Simon Velez, Rossinière — ACM

9-11/10/2013

International Seminar on Chinese Urbanization Mechanisms, Shanghai — LAMU

16-20/10/2013

International Conference and Annual Meeting of the Vernacular Architecture, Vila — ACM

20-22/11/2013

2nd International Workshop on Labyrinth and Piano Key Weirs, Paris, Chatou, France — LCH

26-28/11/2013

EAGE International Conference on Geomechanics and Energy, EPFL, Lausanne — LMS

FACULTY

NEW PROFESSORS APPOINTED AT ENAC IN 2013



**Anja Fröhlich
and Martin Fröhlich**

Associate Professors of Architecture

Anja and Martin Fröhlich gained international recognition through the restoration of Freudenstein Castle at Freiberg in the German state of Saxony. They successfully uncovered the architectural origins of the building and incorporated them into the castle's current use as a museum. Both Anja and Martin Fröhlich have a record of academic achievement and have taught at German universities. At ENAC, they will be heading the Laboratory of Elementary Architecture and Studies of Types.



Kersten Geers

Associate Professor of Architecture

Kersten Geers's best-known project to date is the Belgian Pavilion at the Venice Biennale of Architecture in 2008. In 2002, he founded the Office Kersten Geers David van Severen with his associate David van Severen. Geers has taught at numerous universities including the Graz University of Technology, Austria, as well as at the Academy of Architecture of the Università della Svizzera Italiana in Mendrisio and has been published in the most renowned European architecture journals.



Bernard Cache

*Associate Professor of Architecture
and Digital Fabrication*

EPFL alumni Bernard Cache is a researcher of great intellectual creativity, who knows how to combine digital fabrication and architecture. His strengths lie at the interface between the conception and fabrication of elements, which he develops using software applications. In 1995 he founded a company that creates and sells round and variable elements for the arts, the industry, and architecture. He sold the company in 2011 in order to concentrate on research and teaching. The appointment of Bernard Cache is an important boost for the theory and practice of architecture at EPFL.



Paola Viganò

*Full Professor of Architectural Theory
and Urban Design*

In her research, Paola Viganò explores the latest concepts of urban design and confronts them with the elementary principles of contemporary towns such as sustainability and cultural conservation. She has set new standards in the development of methodological concepts for describing cities, and her publications have helped shape several urban design projects. Paola Viganò runs her own architecture and urban design studio in collaboration with the architect Bernardo Secchi, and has made successful contributions to major international projects such as "Grand Paris" and

"New Moscow". In May 2013, she became the first woman to be awarded the Grand Prix de l'Urbanisme, created in 1989.



**Marco Bakker
and Alexandre Blanc**

Associate Professors of Architecture

Alexandre Blanc and Marco Bakker, two of Switzerland's most renowned and promising architects, founded "Bakker & Blanc architectes associés Sàrl" in 1992. The two architects propose an original "outside of the box" approach, very much open to experimentation. Their vision and their teaching methods will enable students to explore, from a "non-conformist" viewpoint, innovative architectural solutions to challenges presented by the demands of sustainable development.



Nicola Braghieri

Associate Professor of Architecture (80%)

Nicola Braghieri has entered many architectural competitions in Italy and abroad, winning, among others, a mandate design a new residential district in Settimo Milanese in 2002 and the design a housing complex in the canton of Geneva in 2011. In the course of his teaching activity, Nicola Braghieri has developed an "elementary" pedagogical method based on the intimate relationship between theory and practice, aiming as much at technical accuracy as at "poetic" intensity.



Dominique Perrault

Full Professor of Architecture (50%)

Dominique Perrault won international recognition in 1989 after winning the competition to design the French National Library. This immense project was the starting point for many large commissions such as the Velodrome and Olympic swimming pool in Berlin (1992), the extension of the Court of Justice of the European Communities in Luxembourg (1996), the Olympic tennis center and the redesigning of the Manzanares park in Madrid (2002), the campus of Ewha Women's University in Seoul (2004) and the Fukoku tower in Osaka, Japan (2007). His teaching at EPFL will focus on underground architecture as a tool to transform and densify existing towns.

VISITING PROFESSORS AND ACADEMIC HOSTS 2013

ARCHITECTURE

Katia Acozzato, Jean-Pierre Adam, Marc Coniglio, Urs Egg, Ivan Ivelic, David Jolly, Ricardo Lang, Caroline Maniaque, Gildas Milin, Pier Nicola Pagliara

ENVIRONMENTAL ENGINEERING

Edward Eagan Adams, Imrich Barak, Bertram Bocher, Lee Bryant, Gustavo Adolfo Camps-Valls, Andreas Christen, Arnaud De la Fortelle, Isabelle Domart-Coulon, Ellen Dorrepaal, Martin Draper, Salomon Fastig, Susan Gaskin, Pavlos Lagoudakis, Derek D'Arcy Lichti, William M. McClellan, Charles Meneveau, Mariana Neamtu, Frank Peeters, Bjorn Jozef Maria Robroek, Manuel Sanchez-Polo, Graham Sander, Jaroslaw Hubert Stolarski, Stefan Wunderle

PROMOTION

Marilyne Andersen

*Full Professor
Dean of ENAC*

Rizlan Bernier-Latmani

Associate Professor

Anastasios Vasilopoulos

Senior Scientist

Christof Holliger

Full Professor

Alexis Berne

Associate Professor

DEPARTURES

Jed Oliver Kaplan

Jacques Lucan

ENAC FACULTY MEMBERS APPOINTED OUTSIDE EPFL

Jeremy Samuel Arey

*Assistant Professor
Eawag*

David Andrew Barry

*Visiting Professor
University of Edinburgh, United Kingdom*

Luca Bragazza

*Professor
University of Ferrara, Italy*

Alexandre Buttler

*Full Professor
University Franche Comté Besançon, France
Invited Professor
University Adam Mickiewicz, Poznań, Poland*

Franz Graf

*Full Professor in Technology
Accademia di Architettura di Mendrisio*

Jeffrey Huang

*Professor and Head of Pillar (Dean)
Singapore University of Technology and Design, Singapore*

Lyessse Laloui

*Distinguished Adjunct Professor
King Abdulaziz University, Jeddah, Saudi Arabia
Adjunct Professor
School of Civil and Environmental Engineering,
Duke University, USA.*

Jean-Paul Lebet

*Invited Professor
University of Malaya, Kuala Lumpur, Malaysia*

Regine Leibinger

*Full Professor
TU Berlin, Germany*

Marc Parlange

*Dean of Applied Sciences
University of British Columbia*

Fernando Porté-Agel

*Adjunct Professor
University of Minnesota, Dept. of Civil Engineering, USA*

Pramod Rastogi

*Invited Professor
Tsinghua University, Beijing, China*

Andrea Rinaldo

*Professor
University of Padova, Italy*

Ian Smith

*Adjunct Professor
Carnegie Mellon University, Pittsburgh, USA*

Urs von Gunten

*Professor
Eawag
Adjunct Professor
Gwangju Institute of Science and Technology, Korea
State Key Laboratory of Environmental Aquatic
Chemistry, Chinese Academy of Sciences, China
Curtin University, Perth, Australia
Honorary Professor
Harbin Institute of Technology, Harbin, China*

Alfred Johny Wüest

*Professor
Eawag*

Jian Zhao

*Chair Professor
Monash University, Melbourne, Australia*

CIVIL ENGINEERING

Mohd Zamri Bin Ramli, Patricio Bohórquez Rodriguez de Medina, Maurizio Brocchini, Hubert Chanson, Tan Cher Siang, Silvia Cocolo, Christian Dupraz, Mathieu Fiset, Juan Manuel Gallego Martín, Corrado Gisonni, Shaoqing Gou, Giovanni Grasselli, Nico Gray, Gil Honoré, Laureano Hoyos, Tomasz Hueckel, Henrik Broner Jorgensen, Lenka Maierova, Mario Manassero, Jaime Mata Falcón, Fusao Oka, Franck Petitpierre, Stefano Podesta, Antonio Reis, Sivalingam Sritharan, Mechthild Stuhlmacher, Thibaut Vermeulen, Derek Warner, Sebastian Wendel

DISTINCTIONS & AWARDS

Our school has made an impact in the world: here is a sampling of awards received in 2013



LABA RECEIVES MOST BEAUTIFUL BOOK AWARD FOR BARENTS LESSONS

Laba's recent publication "Barents Lessons" was selected as one of the most beautiful Swiss books in 2012, along with 19 other prize recipients. The competition is hosted every year by the Swiss Federal Office of Culture (BAK). "Barents Lessons" met with similar success in Germany, where it was selected as one of the most beautiful books in 2013. The project presented in Barents Lessons focuses on the remote and geographically extreme, yet resource-rich and therefore geo-strategically crucial Barents Sea region, located in the Arctic Ocean, north of Norway and Russia. Starting with the premise that the ocean is an urbanized territory, the participants carried out a one-year investigation, moving from the territorial to the architectural scale.



AN ERC STARTING GRANT FOR TRANSPORT RESEARCH

The European Research Council awarded Nikolas Geroliminis from EPFL's Urban Transport Systems Laboratory with a starting grant of 1.25 million euros. The funding will support research exploring ways to increase passenger capacity on transport networks through advanced traffic management schemes based on developments in monitoring, logistics, modeling, and control of urban traffic. The project, entitled: "Modeling and controlling traffic congestion and propagation in large-scale urban multimodal networks," aims to manage traffic in future cities in a holistic way that, until now, has been impossible, by tackling the problem of modeling and optimization in large congested traffic networks using an aggregated realistic representation of traffic dynamics and route choice for multiple modes of transport.

EUROPA NOSTRA RECOGNIZES STUDY ON THE LIGNON HOUSING COMPLEX

Increasing domestic energy efficiency is particularly challenging in social housing built in the post-war period. At the same time, it is of particular importance, due to the surge in construction during that time. ENAC's Laboratory in Techniques and Preservation of Modern Architecture took this challenge head-on, focusing on the renovation of the Lignon housing complex in Geneva, Switzerland's most ambitious housing project of the post-war decades. The renovation was fraught with challenges, both due to the building's architecture as well as its status as cultural heritage. According to Europa Nostra, the prize jury was won over by the "rigour of the methodology and the exemplary thoroughness of the conclusions of the research."



Teaching and Research Awards

ÁMUNDADÓTTIR María Lovísa

Civil and Environmental Engineering Doctoral Program,
PhD Mobility Award, EPFL, Lausanne

ANDREINI Nicolas

Mechanical Engineering Doctoral Program Award, EPFL, Lausanne

BAKKER Marco,

BLANC Alexander / Bakker & Blanc

First prize in a competition for the development of the medieval Werkhof, Fribourg
/ First prize in a competition for the «Büschlihaus» in Langenthal, Langenthal

BASTIEN MASSE Maléna

Junior Best Paper Award / IABSE Conference, Rotterdam, The Netherlands

BONVIN Florence

14th EuChemMS International Conference, Best poster award, Barcelona, Spain
/ Swiss Chemical Society, Travel Award

BUTTLER Alexandre

Swiss Academy of Science Award for Transdisciplinary Research, Category
«Distinguished Achievement»

CAMUZET Jean / ON Architecture

First Prize, Dance Pavillon, Geneva / First Prize, Primary School, St-Sulpice

CAMUZET Jean

First Prize, Housing in the «Friches Nord» sector, Lausanne

D'ANGELO Luca

Civil and Environmental Engineering Doctoral Program,
PhD Mobility Award, EPFL, Lausanne

DANALET Antonin

ENAC Research Day 2013 Doctoral Poster Award – 3rd Prize, EPFL, Lausanne

DEVANTHÉRY-LAMUNIÈRE Inès

Second Prize, Ecumenical Council of Churches, Geneva

DIETZ Dieter

Swiss Design Prize 2013/14 for the “Montreux Jazz Heritage Lab”
Swiss Design Prize 2013/14 for “St. Prex Luna”

FREY Pierre

DAM Architectural Book Award 2013, Category Monograph/Material,
Frankfurt, Germany

FRÖHLICH Martin / AFF Architetexts

Second Renovation of the façade of the Karlsruhe City Hall, Karlsruhe, Germany /
Architekturpreis Sachsen-Anhalt for the Zentrum Taufe St. Petri-Pauli, Lutherstadt
Eisleben, Sachsen-Anhalt, Germany / BDA Preis Sachsen for Mountainhut
Fichtelberg, Sachsen, Germany

FUMEAUX Loïc Vivien

Selected for the International Holcim Forum for Sustainable
Construction, Mumbai, India

GEROLIMINIS Nikolaos

ERC Starting Grant, EU / Most cited journal paper in the last 5 years —
Transportation Research Part B

GRAF Franz

European Union Cultural Heritage Award – Europa Nostra 2013, Category ‘Scientific
Research’, «Intervention Strategies for the Cité de Lignon», EU / Prix SIA, 2013.
Umsicht-Regards-Sguardi pour des réalisations durables et porteuses d’avenir pour
la recherche, «Intervention Strategies for the Cité de Lignon», Zurich

GUGGER Harry

Stiftung Buchkunst, The Most Beautiful German Books 2013,
Frankfurt/Leipzig, Germany

HUANG Jeffrey

Third Best Poster Award, 17th ETH Conference on Combustion Generated
Nanoparticles, ETH Zurich

JOLY Martin

International Solar Energy Society, Solar World Congress, Solar Energy Journal
Best Paper Award 2012-2013, Cancun, Mexico

LACROIX Elsa Marina

Poster Award – ENAC Research Day 2013, EPFL, Lausanne

LENHERR Lukas

Architectural Award Beton for the project Fünf Häuser, Bern, Betonsuisse /
Swiss Design Prize 2013/14 for the “Montreux Jazz Heritage Lab”

LEROUX Marlène Audrey Bertille

Wallpaper 2013 / The world’s best young practices __ architects directory
2013 __ Archiplein

LUDWIG Christian

Nomination as Member of the International Advisory Council
of the Government of Wuhan, Wuhan, China

MERMOUD Grégory

2013 George Giralt European Robotics Award, EU Robotics Network

MOSER Gaudenz

European Group for Intelligent Computing in Engineering,
Best Paper Award 2013, Vienna, Austria

PARKAN Matthew Josef

Swiss MFSA Award for Spatial Analysis 2013, Saint-Sulpice

PERRAULT Dominique / Dominique Perrault Architecture

Grande médaille d’or de l’Académie d’architecture – 2010, Paris, France / Ame-
rican Institute of Architects, AIA Design Award pour le concours de l’université
de droit de Baltimore – 2009, USA / Prix Mies van der Rohe / Prix de l’Équerre
d’argent du Moniteur, Paris, France

RASTOGI Pramod

Named member of the Swiss Academy of Engineering Sciences, Zurich

REHAK Martin

2nd Conference on Unmanned Airborne Vehicles in Geomatics (UAV-g),
Best Paper Award, Rostock, Germany

REY Emmanuel / Bauart

Architectural Distinction of the Canton of Solothurn 2013 | Mention, Olten / Real
Estate Award 2013 for the Swisswoodhouse Project / First prize for the Quartier
Lentillères Nord, Crissier, Crissier

RINALDO Andrea

Doctorate Honoris Causa, University of Québec-Laval, Canada

ROSSI Luca

Prix Polysphère de Faculté, EPFL / Agepoly

RYCHEN Patrick

Prix VSS — Research and standardization in the field of roads and transportation

SCHLEISS Marc

Prix Luce Grivat

SCHÜLL Raphaël / rsarch

School Center «CO3 de la Gruyère», 4th Prize, Riaz

SKALOUD Jan

GNSS+ 2013, Institute of Navigation, Best Presentation Award,
Nashville, Tennessee, USA

STADNICKA-MICHALAK Julita Maria

Young Scientist Award for the best platform presentation, SETAC Europe

VEILLON Cyril

Type Directors Club, 100 beste Plakate

VERNAY Didier

First International Conference on Civil and Building Engineering Informatics,
Best Paper Award 2013, Tokyo, Japan

VIGANÒ Paola

Grand Prix de l’Urbanisme 2013, France

VON GUNTEN Urs

Distinguished Lecturer for AEESP at the American Water Works Association
Annual Conference, Denver, June 10, 2013, Denver, Colorado, USA

WEISSBRODT David

Prix Luce Grivat, EPFL, Lausanne

XAVIER MERIADE DUARTE Rafael

11th John F. Kennedy Student Paper Competition, Chengdu, China

DISTINCTIONS & AWARDS

BS/MS student awards

BESTOF2013 AWARD

Loris Guillard / Architecture
Romain Louis Masson / Architecture
Jianfeng Chen / Architecture
Ludovic Tiollier / Architecture

DURABILIS AWARD

David Pascal Müller / Architecture

FAS/BSA ROMANDIE 2013 AWARD

Alessia Catellani / Architecture

MAGGIA ENGINEERING AWARD

Davide Wüthrich / Civil Engineering

PRIX ABB 2013

Steffan Heath / Architecture
Edouard Philippe / Architecture

PRIX ALFRED STUCKY

Alessandro D'Amario / Civil Engineering

PRIX ARDITI 2013 EN ARCHITECTURE

Tess Walraven / Architecture
Alessia Catellani / Architecture

PRIX CHARLES MAURHOFER

Caroline Schartz / Architecture

PRIX CONSTRUCTION ET DÉVELOPPEMENT DURABLE

Jade Rudler / Architecture

PRIX CSD

Alex Dionisio Calado / Environmental Engineering

PRIX DE L'ASSOCIATION DES DIPLÔMÉS (A3 - EPFL)

Clément Augustin / Architecture

PRIX DE L'UNION PATRONALE DES INGÉNIEURS ET DES ARCHITECTES VAUDOIS (UPIAV)

Damien Hominal / Architecture
Mathilde Sudan / Architecture
Jean-Luc Wagner / Architecture
Fabian Barras / Civil Engineering

PRIX DE LA BANQUE CANTONALE VAUDOISE

Pauline Demoulin / Architecture
Antoine Fanost / Architecture
Emanuelle Jaques / Architecture
Jérémie Jobin / Architecture
Louis Jucker / Architecture
Anne Käppeli / Architecture
Augustin Mercier / Architecture
Marie Diane Page / Architecture
Grégoire Polikar / Architecture
Hadrien Tricaud / Architecture
Valentino Vitacca / Architecture
Régis Widmer / Architecture
Marie Diane Page / Architecture

PRIX DE LA COMMUNE DE CHAVANNES-PRÈS-RENENS (VD)

Alexandros Fokatis / Architecture

PRIX DE LA SOCIÉTÉ SUISSE DES INGÉNIEURS ET DES ARCHITECTES, SECTION VAUDOISE

Emmanuelle Jaques / Architecture

PRIX JACQUES MARTIN, ZWAHLEN & MAYR

Yanick Dürig / Civil Engineering
Yves Reuland / Civil Engineering

PRIX LUCE GRIVAT

Daniel Wolfensberger / Environmental Engineering
Leonard Evéquoz / Environmental Engineering

PRIX MFSA

Matthew Parkan / Environmental Engineering

PRIX ORLANDO LAUTI

Carole Froidevaux / Architecture

PRIX SIA VAUDOISE - ARCHITECTES

Cyril Lemray / Architecture
Edouard Massip / Architecture
Antoine Allaz / Architecture
François Nantermod / Architecture

SWISS SOCIETY FOR EARTHQUAKE ENGINEERING AND STRUCTURAL DYNAMICS AWARD

Haroun Benaboud / Civil Engineering

TOP-MASTER-WETTBEWERB NZZ CAMPUS AND MAKINGSCIENCENEWS

Carmen Fischer / Architecture
Caroline Iorio / Architecture

The full list of ENAC's scientific output is available online:

<http://infoscience.epfl.ch/enac>

GLOBALIZATION OF URBANITY

Josep Acebillo, Jacques Lévy, Christian Schmid

iCup, Mendrisio, 2013

ISBN 978-8-492861811



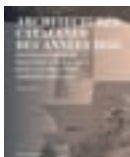
ARCHITECTURES CATALANES DES ANNEES 1950

*Photographies de Francesc Català-Roca dans
la collection Alberto Sartoris*

Antoine Baudin

Presses polytechniques et universitaires romandes PPUR, Lausanne, 2013

ISBN 978-2-88915-019-9



PIER LUIGI NERVI OU L'ART DE LA STRUCTURE

Photographies de la collection Alberto Sartoris

Alberto Bologna

Presses polytechniques et universitaires romandes PPUR,

Lausanne, 2013 — ISBN 978-2-88915-049-6



PIER LUIGI NERVI NEGLI STATI UNITI

1952-1979. 'Master Builder of the Modern Age'

Alberto Bologna

Firenze University Press, Florence, 2013

ISBN 978-88-6655-368-7



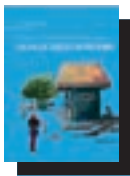
LA VILLE OUEST-AFRICAINNE

Modèles de planification de l'espace urbain

Jérôme Chenal

Metispresses vuesDensemble, Genève, 2013

ISBN 978-2-940406-18-0



DE LA DIFFERENCE URBAINE

Les quartier des Grottes/Genève

Elena Cogato Lanza, Luca Pattaroni, Mischa-Sébastien Piraud, Barbara Tirone Chabert

Metispresses vuesDensemble, Genève, 2013

ISBN 978-2-94-0406-5-00



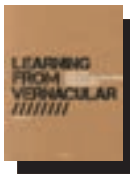
LEARNING FROM VERNACULAR

Towards a New Vernacular Architecture

Pierre Frey

The Munio Gitai Weinraub Architecture Museum, Haifa, 2013

ISBN 978-2-74279-387-7



SIMÓN VÉLEZ ARCHITECTE

La maîtrise du bambou

Pierre Frey, Deidi von Schaewen

Actes Sud, Arles, 2013

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SOURCES D'INFORMATIONS ET UTILISATION DES STATISTIQUES PAR LES CHERCHEURS DU PNR 54

A Full-Field Approach

Martin Froidevaux (ed.), Yannick

Schneeberger (ed.), Martin Schuler (ed.)

Hochschulverlag AG - ETH Zürich, Zürich, 2013 — ISBN 978-3-7281-3500-1



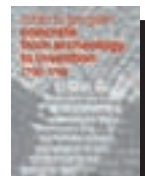
CONCRETE FROM ARCHEOLOGY TO INVENTION

1700-1769

Roberto Gargiani

EPFL Press, Lausanne, 2013

ISBN 978-2-940222-64-3



DEPOSITO AVEGNO, 1953-1955

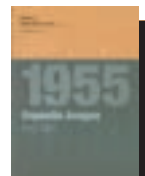
Officine Idroelettriche della Maggia S.A.

Architetto Rino Tami

Franz Graf (ed.), Britta Buzzi-Huppert (ed.)

Mendrisio Academy Press, Mendrisio, 2013

ISBN 978-88-876-24-601



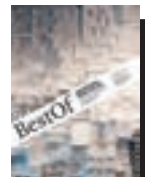
BEST OF ARCHITECTURAL DESIGN

2013 Students' projects competition

Jeannette Kuo, Cyril Veillon (ed.)

Editions Archizoom, Lausanne, 2013

ISBN 978-2-88915-045-8



ENERGY GEOSTRUCTURES

Innovation in Underground Engineering

Lyesse Laloui (ed.), Alice Di Donna

Wiley-ISTE, Hoboken, NJ, 2013

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STEEL BRIDGES

*Conceptual and Structural Design of Steel and
Steel-Concrete Composite Bridges*

Jean-Paul Lebet, Manfred A Hirt

EPFL Press and CRC Press, Lausanne, 2013

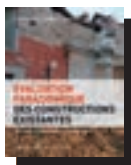
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EVALUATION PARASISMIQUE DES CONSTRUCTIONS EXISTANTES

Pierino Lestuzzi, Marc Badoux

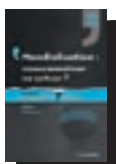
Presses polytechniques et universitaires romandes PPUR, Lausanne, 2013
ISBN 978-2-88074-990-3



MONDIALISATION : CONSOMMATEUR OU ACTEUR

Jacques Lévy, Jacques Cossart, Lucas Léger

Le Muscadier, Paris, 2013
ISBN 979-1-090685123

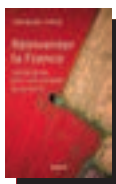


RÉINVENTER LA FRANCE

Trente cartes pour une nouvelle géographie

Jacques Lévy

Fayard, Paris, 2013
ISBN 978-2213671970



DICTIONNAIRE DE LA GEOGRAPHIE ET DE L'ESPACE DES SOCIÉTÉS

Jacques Lévy (ed.), Michel Lussault (ed.)

Belin, Paris, 2013 — ISBN 978-2-7011-6395-6

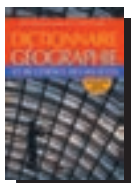


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Pour une ingénierie des modes de vie

Michaël Louvet, Vincent Kaufmann, Michaël Thémans, Sylvanie Godillon, Hélène Nessi, Anaïs Rocci, Camille Le Bris, François Adoue

Editions Loco, Paris, 2013 — ISBN 978-2-919507-13-9

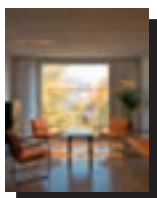


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Etablissements médicaux sociaux vaudois

Bruno Marchand, Marielle Savoyat

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A tradition organique : des tours de la Borde (1961-1968) de Frédéric Brugger aux réalisations contemporaines

Bruno Marchand

Infofolio éditions, Gollion, 2013 — ISBN 978-2-88474-459-1



URBAN FREIGHT TRANSPORT MODELLING

An agent-specific approach

Edoardo Marcucci, Valerio Gatta, Eva Valeri, Amanda Stathopoulos

FrancoAngeli, 2013 — ISBN 9788856859836



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Springer, Berlin Heidelberg, 2013 — ISBN 978-3-642-32722-3



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Benny Raphael, Ian F. C. Smith

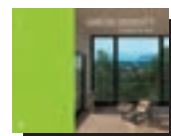
Wiley, Hoboken, NJ, 2013
ISBN 978-1-11853632-2



GREEN DENSITY

Emmanuel Rey (ed.)

Presses polytechniques et universitaires romandes PPUR, Lausanne, 2013
ISBN 978-2-88915-021-2



ANNUAL DYNAMICS OF DAYLIGHT VARIABILITY AND CONTRAST

A Simulation-Based Approach to Quantifying Visual Effects in Architecture

Siobhan Francois Rockcastle, Marilyne Andersen

Springer, London, 2013 — ISBN 978-1-4471-5232-3



LE CORBUSIER E LA SUPERFICIE

Dal rivestimento d'intonaco al béton brut

Anna Rosellini

Aracne Editore, Roma, 2013 — ISBN 978-8854859081



URBANISME ET MODES DE VIE

Enquête sur les choix résidentiels des familles en Suisse

Marie-Paule Thomas

Alphil - Presses universitaires suisses, Neuchâtel, 2013
ISBN 978-2-940489-05-3



LES HORIZONS DE LA GOUVERNANCE TERRITORIALE

Luc Vodoz (ed.), Laurent Thévoz (ed.), Prisca Faure (ed.)

Presses polytechniques et universitaires romandes PPUR, Lausanne, 2013 — ISBN 978-2-88915-007-6



FACTS & FIGURES

2540 students, including 290 PhD students who contribute to ENAC's long-term research
731 collaborators, or 605.5 full-time equivalent positions
83 million CHF — total ENAC budget
68,8 % of staff between 20 and 40 years old
51 nationalities
21 research and technology transfer agreements, totaling 1.8 million CHF

PEOPLE

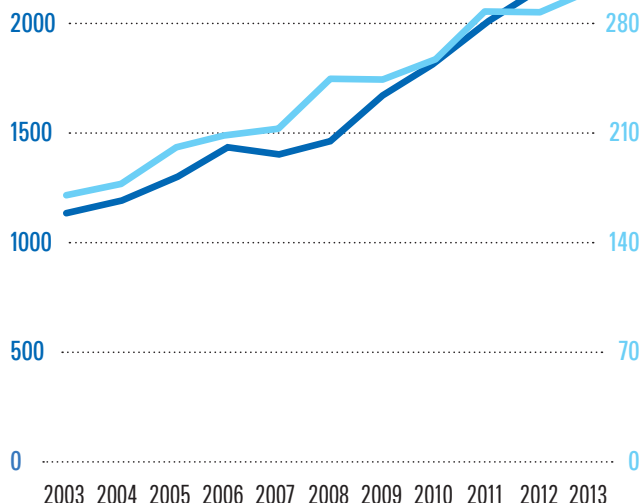
31.12.2013

	EPT	% Women	% Foreigners
Professors	48.3	12.2%	49.9%
Adjunct professors & Senior scientists	12.7	6.2%	41.7%
Scientific collaborators	423.8	34%	73%
Technical & Administrative staff	120.8	39%	8.9%

	No.	% Women	% Foreigners
BS/MS students	2189	38.2%	37.1%
PhD students	290	38.6%	78.6%

STUDENT NUMBERS

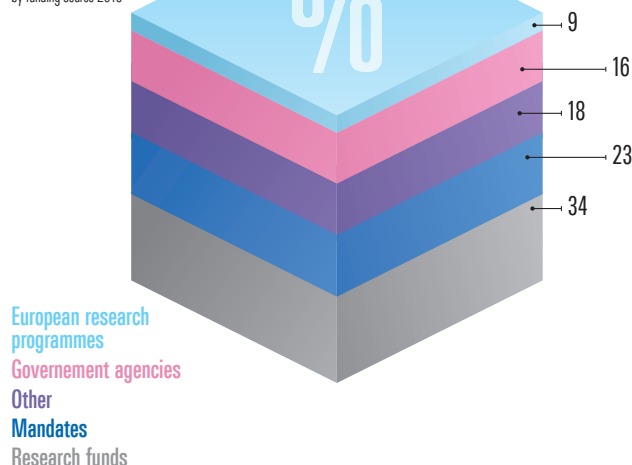
BS/MS students PhD students



FINANCES

EXTERNAL FUNDS

by funding source 2013



EXPENDITURES

by category 2013



INCOME BY FUNDING SOURCE 2009-2013

in Mio CHF rounded up

	2009	2010	2011	2012	2013
EPFL	53	54	59	59	63
External	20	21	22	21	21
Total	73	75	81	80	83

EXPENDITURES BY CATEGORY 2009-2013

in Mio CHF rounded up

	2009	2010	2011	2012	2013
Personnel	62	64	66	68	68
Operating c.	8	9	10	9	11
Investments	3	2	5	3	4
Total	73	75	81	80	83

CREDITS

PROJECT SUPERVISOR

Jan Overney
Jean-Daniel Bonjour

CONTRIBUTING WRITERS AND TRANSLATION

Jan Overney
Sandy Evangelista
Cyril Veillon

DESIGN

Basile Geiser
www.basilegeiser.ch

PHOTOGRAPHS

Yves André / p. 33.2
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PRINTING

REPRO EPFL

AREAS OF EXPERTISE

Dynamic list on the web: <http://enac.epfl.ch/faculty>

ARCHITECTURE

ABOU JAOUDE Georges – Associate Professor

The architectural and digital model as representation of the project, Photography and digital photo architecture and hyperreality of the domain of computer science

Informatic and Visualization Laboratory (LIV)



ANDERSEN Marilyne – Full Professor

Sustainable architecture, Daylighting strategies, Energy-efficient design, Façade technology, Human comfort and health in buildings, Climate-responsive envelopes

Interdisciplinary Laboratory of Performance-Integrated Design (LIPID)



BAKKER Marco – Associate Professor

The constructing of the constructed, temporality in architecture & urbanism, the sensuality of manufacturing, the phenomena of the 'different space' in tourism

Laboratory for Spatial Manufacturing (MANSLAB)



BASSI Andrea – Associate Professor

Urban project, Construction technologies, Energy considerations for building

Laboratory of urban architecture (LAURE)



BLANC Alexandre – Associate Professor

The constructing of the constructed, temporality in architecture & urbanism, the sensuality of manufacturing, the phenomena of the 'different space' in tourism

Laboratory for Spatial Manufacturing (MANSLAB)



BRAGHIERI Nicola – Associate Professor

Architectural representation, digital fine arts, theories of visual expression

Arts of sciences laboratory - Archives of imaginary (LAPIS)



CACHE Bernard – Associate Professor

Computer aided design and manufacturing

Laboratory of Digital Culture for Architectural Projects (CNPA)



COGATO LANZA Elena – Senior Scientist

Theory of urban and territorial design, History of urbanism

Laboratory of Urbanism (LAB-U)



DIETZ Dieter – Associate Professor

Processual knowledge in architectural training, Cultural analysis at the interface between the theory and practice of a project

Design Studio on the Conception of Space (ALICE)



FREY Pierre – Adjunct Professor

History of architecture, Archiving and recording of projects in architecture and civil engineering

Archives of Modern Building (ACM)



FRÖHLICH Anja – Associate Professor

Building typology, new ways of organizing space and programs into a 'hybrid' whole, creating opportunities for alternative social and urban dynamics

Laboratory of Elementary Architecture and Studies of Types (EAST)



FRÖHLICH Martin – Associate Professor

Building typology, new ways of organizing space and programs into a 'hybrid' whole, creating opportunities for alternative social and urban dynamics

Laboratory of Elementary Architecture and Studies of Types (EAST)



GARGIANI Roberto – Full Professor

Theory and history of techniques, Materials, Working processes, Structural systems, Analysis of constructive aspects of buildings

Theory and History of Architecture Laboratory 3 (LTH3)



GEERS Kersten – Associate Professor

Architecture for the city or the field

Laboratory for architecture as form (FORM)



GRAF Franz – Associate Professor

Building and comfort technologies, Preservation and reuse project of the modern architecture

Laboratory of Techniques and Preservation of Modern Architecture (TSAM)



GUGGER Harry – Full Professor

Research and design in architectural, urban and rural Environments, Research and application of contemporary teaching methods

Laboratory Basel (LABA)



HUANG Jeffrey – Full Professor

Computational urbanism, Digital architecture, Smart cities, Parametric design, Artificial morphogenesis, Design thinking

Media and Design Laboratory (LDM)



DEVANTHERY-LAMUNIÈRE Inès – Full Professor

Architecture and urban planning, Complex design and infrastructures, Urban culture

Urban Architecture and Mobility Laboratory (LAMU)



AREAS OF EXPERTISE

MARCHAND Bruno – Full Professor

Theory of architecture, Rational architecture, Relationships between public spaces and collective housing

Theory and History of Architecture Laboratory 2 (LTH2)



ORTELLI Luca – Full Professor

Architectural design within historic contexts, Re-use and transformation of existing buildings, Housing as urban project

Construction and Conservation Laboratory (LCC)



PERRAULT Dominique – Full Professor of Architecture (50%)

Underground architecture

Laboratory of Underground Architecture (SUB)



REY Emmanuel – Assistant Professor Tenure Track

Sustainable architecture, Urban and architectural design, Sustainable construction technologies, Regeneration of urban wastelands, Sustainable neighborhoods

Laboratory of Architecture and Sustainable Technologies (LAST)



VIGANÒ Paola – Full Professor

Urban Design, Landscape Urbanism, Regional and Environmental Planning

Laboratory of Urbanism (LAB-U)



CIVIL ENGINEERING

ANCEY Christophe – Associate Professor

Rheology & fluid dynamics of geophysical flow and the resulting hazards, Modeling of natural hazards induced by water and avalanches, Physics of bed load transport

Environmental Hydraulics Laboratory (LHE)



BEYER Katrin – Assistant Professor Tenure Track

Performance-based seismic design and assessment of structures, Displacement-based design, Seismic behaviour of reinforced concrete and unreinforced masonry structures, Large-scale testing, Structural dynamics

Earthquake Engineering and Structural Dynamics Laboratory (EESD)



BRÜHWILER Eugen – Full Professor

Safety and reliability of existing structures, Durability of reinforced concrete structures, Ultra-high performance fiber-reinforced concrete for the rehabilitation of structures

Structural Maintenance and Safety Laboratory (MCS)



DENARIÉ Emmanuel – Senior Scientist

Rehabilitation of reinforced concrete structures, Engineering and applications of ultra-high performance fiber-reinforced concretes, Time dependent response of cementitious materials

Structural Maintenance and Safety Laboratory (MCS)



DUMONT André-Gilles – Full Professor

Design of traffic facilities and transport infrastructures, Transport and telematics, Infrastructure maintenance management

Traffic Facilities Laboratory (LAVOC)



KELLER Thomas – Full Professor

Structural design, Advanced composite materials, Multifunctional sandwich structures

Composite Construction Laboratory (CCLAB)



LABIOUSE Vincent – Senior Scientist

Cliff instabilities, Design of deep tunnels, Mechanical behaviour of poor rocks, Foundation engineering

Rock Mechanics Laboratory (LMR)



LALOUÏ Lyesse – Associate Professor

Geomechanics, Geotechnical and environmental engineering, Mechanics of multiphase porous materials

Soil Mechanics Laboratory (LMS)



LEBET Jean-Paul – Adjunct Professor

Design evaluation of structures, Failure analysis, Steel-concrete composite bridge behaviour, Steel-concrete composite columns and beams

Steel Structures Laboratory (ICOM)



LESTUZZI Pierino – Senior Scientist

Seismic behavior of reinforced concrete and masonry structures, Seismic evaluation of existing structures, Seismic vulnerability of cultural heritage buildings

Applied Computing and Mechanics Laboratory (IMAC)



MOLINARI Jean-François – Full Professor

Damage mechanisms in materials and structures, Contact mechanics, Multiscale modeling: from atoms to continuum, Scientific computing

Computational Solid Mechanics Laboratory (LSMS)



MUTTONI Aurelio – Full Professor

Conceptual design and dimensioning of structures, Mechanical behavior of ultra-high performance concrete elements and soil-structure interaction

Structural Concrete Laboratory (IBETON)



NUSSBAUMER Alain – *Adjunct Professor*

Structural design of steel and steel-concrete composite structures, Tubular structures and bridges, Fatigue and fracture of new and existing steel and aluminum structures, Probabilistic fracture mechanics and size effects

Steel Structures Laboratory (ICOM)



RASTOGI Pramod – *Adjunct Professor*

Development of new speckle techniques, Development of new holographic techniques, Fringe analysis using phase shifting techniques

Applied Computing and Mechanics Laboratory (IMAC)



SCARTEZZINI Jean-Louis – *Full Professor*

Daylighting systems, Photometry & colorimetry, Biomimetic control, Optimal stochastic control, Energy in buildings, Decision tools

Solar Energy and Building Physics Laboratory (LESO-PB)



SCHLEISS Anton – *Full Professor*

Hydraulic engineering and design of hydraulic structures and schemes, Interaction hydraulic structures with water, air, sediments and rock, Numerical and physical modeling, Flood modeling and forecasting

Hydraulic Constructions Laboratory (LCH)



SMITH Ian – *Full Professor*

Active structures, Structural identification, Sensor network design, Computer-aided engineering, Engineer-computer interaction

Applied Computing and Mechanics Laboratory (IMAC)



VASILOPOULOS Anastasios – *Senior Scientist*

Mechanical behavior of composite materials and joints. Fatigue and fracture of composite materials and structures. Development of design methodologies for composites

Composite Construction Laboratory (CCLAB)



VULLIET Laurent – *Full Professor*

Design and testing of geostructures, Constitutive modeling, elasto-visco-plasticity, numerical modeling, Natural hazards: risk management

Soil Mechanics Laboratory (LMS)



WEINAND Yves – *Associate Professor*

Composite frames of wood and glass, Timber rib shells, Origami, Fractal geometry, Welding for wood, Stability of ribbed wooden shells

Chair of Timber Construction (IBOIS)



ZHAO Jian – *Full Professor*

Rock dynamics, TBM excavation, Rock engineering of tunnels: slope and foundation, Testing characterisation and monitoring, Earthquake and blast protection

Rock Mechanics Laboratory (LMR)



URBAN AND REGIONAL SCIENCES

BIERLAIRE Michel – *Full Professor*

Transportation analysis, Operations research, Discrete choice models, Nonlinear optimization

Transportation and Mobility Laboratory (TRANSP-OR)



BOLAY Jean-Claude – *Adjunct Professor*

Social practices in urban societies, Rural-urban interface, Urban environment and social disparities, Director of international cooperation

Urban Sociology Laboratory (LASUR)



GEROLIMINIS Nikolas – *Assistant Professor Tenure Track*

Traffic flow and control, Transport analysis, Transport operations

Urban Transport Systems Laboratory (LUTS)



GNANSOUNOU Edgard – *Adjunct Professor*

Integrated energy planning, Vulnerability of energy supply, Life-cycle analysis of energy systems, Sustainability of renewable energies (incl. bio-energy)

Bioenergy and Energy Planning Research Group (BPE)



KAUFMANN Vincent – *Associate Professor*

Mobility, Habitat and residential history, Violence and security, Urban sprawl and gentrification, Commuting

Urban Sociology Laboratory (LASUR)



LÉVY Jacques – *Full Professor*

Urbanism, Land use planning and territorial development, Globalization, Political space, Epistemology of social science

Chôros Laboratory (LAC)



PEDRAZZINI Yves – *Senior Scientist*

Urban sociology, Urban studies, Violence and insecurity, Urban planning and development, Southern urbanization

Urban Sociology Laboratory (LASUR)



PATTARONI Luca – *Senior Scientist*

Habitat and housing policy, Urban movements, Critical urban theory, Social work, Sociology theory, Action theory, Political and moral philosophy

Urban Sociology Laboratory (LASUR)



THALMANN Philippe – *Associate Professor*

Environmental economics, Economics of sustainable development, Housing economics, Real estate economics

Economics and Environmental Management Laboratory (REME)



AREAS OF EXPERTISE

ENVIRONMENTAL ENGINEERING

AREY J. Samuel – Assistant Professor Tenure Track

Environmental chemical processes affecting organic pollutants, Computational quantum chemistry and thermodynamics, Phase partitioning and sorption models, Oil spills, Two-dimensional gas chromatography (GCxGC)

Environmental Chemistry Modeling Laboratory (LMCE)



BARRY D. Andrew – Full Professor

Water quality, Contaminated land/soils, Numerical modeling, Constructed wetlands

Ecological Engineering Laboratory (ECOL)



BERNE Alexis – Associate Professor

Hydrometeorology, Radar remote sensing, Geostatistics

Environmental Remote Sensing Laboratory (LTE)



BERNIER-LATMANI Rizlan – Associate Professor

Metal-microbe interactions, Metal bioremediation, Gene expression, Biogenic nanoparticles, Geobiology

Environmental Microbiology Laboratory (EML)



BUTTLER Alexandre – Adjunct Professor

Ecology, Quantitative methods, Ecosystem and landscape restoration and management, Biodiversity, Biogeochemical cycles, Wetlands, Pasture woodlands, Invasions

Ecological Systems Laboratory (ECOS)



DE ALENCASTRO Luiz Felipe – Senior Scientist

Analytical chemistry of environmental trace pollutants, Fate and impact of contaminants in the ecosystem, Water quality, Scientific cooperation with developing countries

Central Environmental Laboratory (GR-CEL)



GOLAY François – Full Professor

GIS application design, Spatial decision support systems, Geospatial data infrastructures, GIS for environmental management and for urban studies and design

Geographic Information Systems Laboratory (LASIG)



HERING Janet – Full Professor

Biogeochemical cycling of trace metals and metalloids, Mineral weathering and reactions at mineral surfaces, Water treatment processes for removal of inorganic contaminants

Prof. Hering Group in Environmental Chemistry (UPHCE)



HOLLIGER Christof – Full Professor

Bioremediation, Wastewater treatment, Environmental microbiology, Anaerobic digestion, Biogas and biofuels

Laboratory for Environmental Biotechnology (LBE)



KOHN Tamar – Assistant Professor Tenure Track

Environmental virology, Disinfection, Low-cost water treatment, Degradation and elimination of chemical pollutants

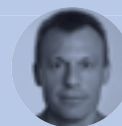
Environmental Chemistry Laboratory (LCE)



LEHNING Michael – Full Professor

Interaction cryosphere-atmosphere in particular snow processes, Natural hazards warning and forecasting, Turbulence and boundary layer flows over alpine terrain, Mountain hydrology and permafrost modeling

Laboratory of Cryospheric Sciences (CRYOS)



LUDWIG Christian – Adjunct Professor

Waste and biomass processing, Materials cycles and resource recovery, Bioenergy technology development, Thermochemical processes, Trace compounds in hot process gases

EPFL-PSI Joint Professorship on Solid Waste Treatment



MARTINOLI Alcherio – Associate Professor

Swarm intelligence, Distributed and networked robotics, S&A networks

Distributed Intelligent Systems and Algorithms Laboratory (DISAL)



MEIBOM Anders – Full Professor

Waste and biomass processing, Materials cycles and resource recovery, Bioenergy technology development, Thermochemical processes, Trace compounds in hot process gases

Laboratory for Biological Geochemistry (LGB)



MERMINOD Bertrand – Full Professor

Acquisition of topographical data, Geodesy, Satellite positioning, Pedestrian navigation, Indoor positioning, Least squares estimation, Kalman filtering

Geodetic Engineering Laboratory (TOPO)



PARLANGE Marc – Full Professor

Land-atmosphere exchange, Large Eddy Simulation (LES), Evaporation, Snow physics, Atmospheric boundary layer

Environmental Fluid Mechanics Laboratory (EFLUM)



PERONA Paolo – SNF Assistant Professor

River mechanics and erosion processes, Alpine catchments ecohydrology, Rheology and fluid mechanics, Time Series Analysis, Stochastic and dynamical systems theory, Optimization and decisional techniques

Applied HydroEconomics & Alpine environmental Dynamics Group (AHEAD)



PORTÉ-AGEL Fernando – Full Professor

Fluid Dynamics (environmental and computational), Wind Energy, Hydrokinetic Energy, Large-Eddy Simulation, Turbulence

Wind Engineering and Renewable Energy Laboratory (WIRE)



RINALDO Andrea – Full Professor

Groundwater and surface hydrology, Solute transport processes, Fluvial geomorphology, Ecohydrology

Laboratory of Ecohydrology (ECHO)



SCHIRMER Kristin – Adjunct Professor

Aquatic ecotoxicology, Mechanisms of chemical and nanoparticle toxicity, In vitro alternatives to animal tests for risk assessment

Laboratory of Environmental Toxicology (TOX)



SKALOUD Jan – Senior Scientist

Kinematic positioning and attitude estimation mobile mapping, Satellite and inertial navigation, Sensor integration and calibration, Direct georeferencing

Geodetic Engineering Laboratory (TOPO)



STEFFEN Konrad – Full Professor

Polar climatology, Ice sheet mass balance and sea level change, Changes in the cryosphere in a warming climate, Remote sensing applications for climate system studies

Prof. Steffen Group in Cryosphere Sciences (UPSSC)



TAKAHANMA Satoshi – Assistant Professor Tenure Track

Measurement, analysis, and modeling of atmospheric aerosols, Simulation of multiphase chemistry and physics, Spectroscopy and spectromicroscopy analysis for particle composition and morphology characterization

Atmospheric Particle Research Laboratory (APRL)



VON GUNTEN Urs – Full Professor

Drinking water quality, Physical chemical water treatment, Oxidation and disinfection processes, Micropollutant elimination, Disinfection by-product formation

Laboratory for Water Quality and Treatment (LTQE)



WÜEST Alfred Johny – Full Professor

Turbulence and mixing in natural waters, Modelling of currents and internal waves, Boundary layer processes and double diffusion, Aquatic system analysis (climate, water quality)

Physics of Aquatic Systems Laboratory – Margaretha Kamprad Chair (APHYS)



CHAIR OF LAW

DUBEY Jacques – Associate Professor

Law, Environmental and construction law

Chair of Law (CDT)



ROMY Isabelle – Associate Professor

Law, Environmental and construction law

Chair of Law (CDT)



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