

Perspectives on Daylight

Program booklet

ETH Sustainability
Winter School 2019



Zurich, December 2018

Dear participants,

We warmly welcome you to the ETH Sustainability Winter School 2019 "Perspectives on Daylight".

This Winter School was organized by ETH Sustainability, the central hub for coordinating sustainability activities at ETH Zurich, in collaboration with the Daylight Academy, an initiative of the "Velux Stiftung" for the promotion of international and interdisciplinary cooperation in daylight research.

ETH Zurich aims to pass on to its students the highest level of knowledge and skills. It wants everyone to feel at ease and capable in complex and rapidly evolving environments, while at the same time being able to maintain an understanding for ethical and cultural values. On this basis, this Winter School aims to contribute to a sound foundation for the next generation of decision makers and future leaders.

During our Winter School, we create an environment in which you will work in interdisciplinary and international teams. You will receive inputs from experts of different fields, namely environment, health, architecture and technology. During six days, you will get the chance to interlink these fields and discuss the relevance of daylight for the sustainable development of our society. Dialogues with the experts will help you deepen your understanding of the topics and increase your critical thinking process. Furthermore, you will work in a small team of six students on creating daylight related solutions for a sustainable city. For this we invite you to integrate your own expertise and experiences with the expert inputs that you will receive during the week.

We would like to thank all experts listed in this program, the steering board and the team of ETH Sustainability for organizing the week, the Daylight Academy for their financial support and the team of Hotel Edelweiss for hosting us.

Last but not least a big thank you goes to all of you who will contribute to this winter school aiming to make it a unique learning experience.

We are looking forward to working and learning with you!

This Winter School is organized by the ETH Zurich in collaboration with the Daylight Academy:

ETH zürich

DLA
DAYLIGHT
ACADEMY



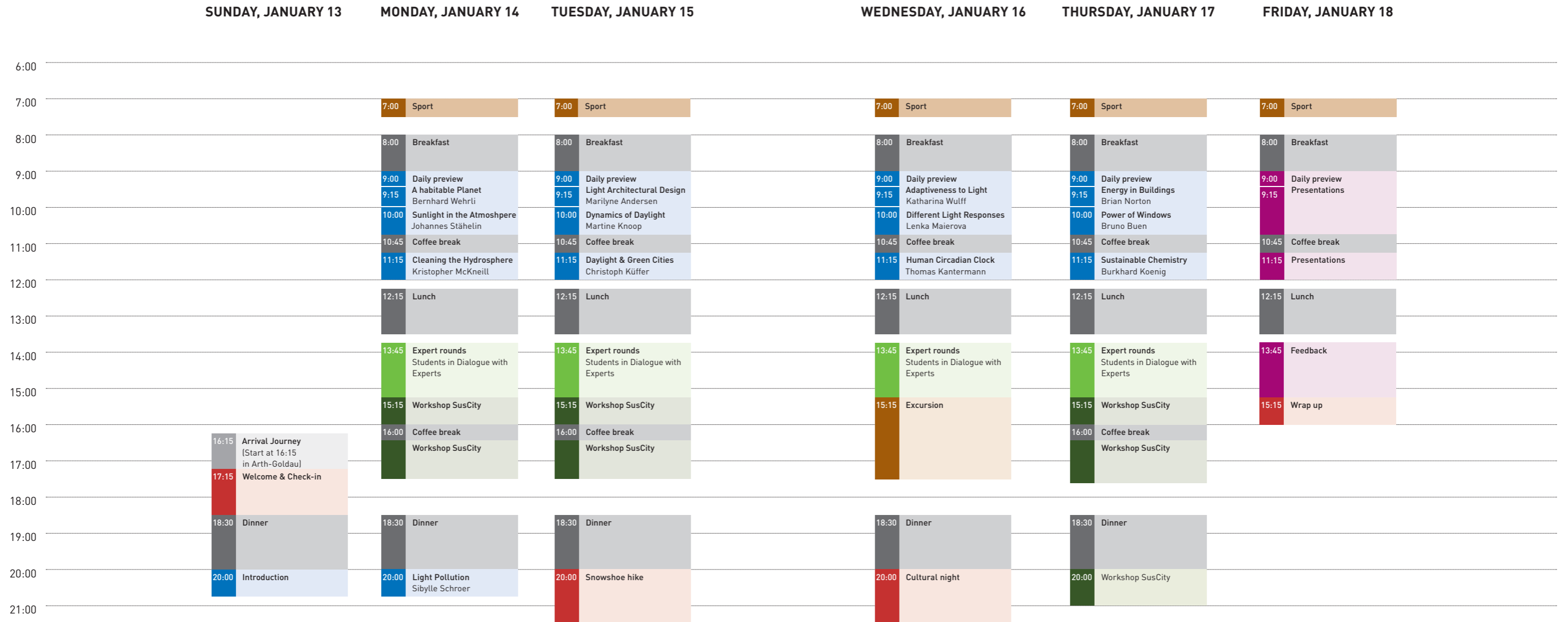
Dr. Christine Bratrich
Director ETH Sustainability



Prof. Bernhard Wehrli
ETH Zurich & Daylight Academy

Program

The ETH Sustainability Winter School "Perspectives on Daylight" lasts six days and offers you a balance of theoretical input, discussions with experts and workshops.



- Journey
- Side program
- Group work
- Excursion
- Meals & breaks
- Inputs
- Expert rounds
- Final presentations

Learning outcomes & qualifications

The ETH Sustainability Winter School 2019 is providing you with the following qualifications and learning outcomes:

Improved scientific competence:

- You will gain knowledge in a range of scientific disciplines that goes beyond your own field of study to extend your understanding of the effects of daylight on the environment, human health and architecture.
- You will be able to apply theoretical knowledge gained from expert presentations in your group work in order to develop sustainable solutions involving daylight.

Methodological competence:

- You are going to gain skills in scientific methods that go beyond your study discipline.
- You will be able to assess the basic environmental, societal, political, economic and engineering challenges around daylight in the urban context .
- Through workshops, you will apply the newly gained knowledge by developing sustainable solutions.

Reflection competence:

- You are going to learn how to work in interdisciplinary and intercultural teams, to critically reflect on your own way of thinking, your own research approaches, and how the academic world influences society.
- You will be able to critically reflect on the economic, ecological and societal relevance of daylight in the urban environment.

Practical skills:

- Through the workshop, you will work in small interdisciplinary teams which will build your capacity for teamwork and enhance your cooperation skills.
- You will train your capacity to find creative solutions for urban sustainability issues while incorporating the theoretical knowledge acquired.

Input Lecturers

Monday: Daylight & Environment

Daylight on a habitable Planet

Monday, January 14 • 9:15 — 10:00

Planet Earth is circling the Sun within the habitable zone where water exists as a liquid. Due to an astronomical accident, a large Moon stabilizes and slows down the rotation of our planet establishing a regular cycle of days and nights, summers and winters. Geochemical feedback mechanisms keep Earth's climate comfortable for life although the power of the sun is increasing over geological timescales. The invention of photosynthesis provided the basis for several energy revolutions in the biosphere and anthroposphere. Algae and land plants are harvesting daylight; they maintain an oxidative atmosphere and accumulate organic carbon that fueled the evolution of animal life. We can understand the history of humanity as a struggle for independence from the natural clock of day and night, summer and winter. By using fire, saving summer's harvest for the winter, domesticating animals and extracting fossil fuels we expanded our energy footprint in order to gain autonomy for technological and scientific developments. Now we face the risk that we force the earth system across planetary boundaries, which could damage the biosphere irreversibly. We have to re-adjust some of our activities and harness daylight as a sustainable energy source.

Bernhard Wehrli studied chemistry at ETH Zurich and sanitation and water protection at Eawag – the Swiss Federal Institute for Aquatic Science and Technology. After research at Caltech in Pasadena and the University of Paris, he started a research group at ETH Zurich and Eawag in 1991 and is now professor for Aquatic Chemistry. He is interested in element cycles, sustainable use of natural resources and interdisciplinary research and teaching.



Bernhard Wehrli
Professor for Aquatic Chemistry
at ETH Zurich, Switzerland.

Sunlight in the Atmosphere

Monday, January 14 • 10:00 — 10:45

Solar light modulating in intensity over different time scales is crucial for life. The high energy of the ultraviolet light leads by photolysis of molecular oxygen to the ozone layer is required for life as known on Earth's surface. The Montreal Protocol (1987) protects the Earth's surface from the decrease in the ozone layer by increasing emissions of Ozone Depleting Substances such as Chlorofluorocarbons. Ultraviolet and visible solar radiation (wavelengths above around 300 nm) regulates tropospheric chemistry such as degradation of many pollutants as well as formation of photochemical smog including ozone formed from anthropogenic primary pollutants. Thermal radiation of the Earth's atmosphere is determined by solar infrared radiation modulated by greenhouse gases. (Anthropogenic) climate change is attributable to the increases in anthropogenic emissions of greenhouse gases most important by present fossil fuel emission. Climate change might lead to the "super recovery" of the ozone layer leading to lower UV intensity in (winter) mid-latitude.

Johannes Staehelin studied chemistry at the University of Zürich and he finished his PhD degree (ozone decomposition in water) at EAWAG/ETH Zurich. Employed at the Institute for Atmospheric and Climate Science at ETH Zurich he contributed with important studies on stratospheric ozone, connected to the world longest total ozone series of Arosa (Switzerland). He became a professor at ETH Zurich in 2002. Johannes Staehelin has excelled in international collaboration such as chairperson of the Scientific Advisory Group for Ozone of the Global Atmosphere Watch (GAW) of the World Meteorological Organization (WMO) and as the director of Project Office of SPARC (Stratospheric Processes And their Role on Climate, a core project of the World Climate Research Project (WCRP). Recently he focusses on history of the Light Climatic Observatory (LKO) in Arosa.



Johannes Stähelin
Professor adjunct and ozone
expert at ETH Zürich, Switzerland
retired in 2014.

Daylight cleaning the Hydrosphere

Monday, January 14 • 11:15 — 12:00

Sunlight-driven photochemistry is an important process in the breakdown of pollutants and in natural element cycles. Central to these processes are many high energy, reactive intermediates, such as hydroxyl radical, singlet oxygen, and excited triplet states. This lecture will focus on the breakdown of pollutants in natural waters by sunlight and the involved mechanisms.

Kris McNeill is the professor for Environmental Chemistry at ETH Zurich. Born in Tucson, Arizona in the United States, Kris attended Reed College in Portland, Oregon for his Bachelor's and UC Berkeley for his PhD in Chemistry. Following a postdoctoral researcher position at MIT, Kris took a position as an assistant professor of chemistry at the University of Minnesota in 2000. Kris moved to ETH Zurich in 2010. He studies the photochemistry of natural and manmade compounds in natural waters among other topics.



Kristopher McNeill
Professor of Environmental
Chemistry at ETH Zurich,
Switzerland.

Daylight from Dusk till Dawn

Monday, January 14 • 20:00 — 20:45

Artificial light at night is increasing the brightness of nightscapes globally by 2-6 percent per year. It has significant impact on the living environment of crepuscular and nocturnal organisms. Nocturnal wildlife has developed senses adapted to the low brightness levels of the night. Artificial light at night can disturb ecosystems and services, which are important for our living conditions. A better understanding of how light at night affects wildlife is an important step towards improving lighting technology and design. Contemporary outdoor lighting often lacks sustainable planning, even though the protection of species, habitat and human well-being could be improved by adopting simple technical measures. Sustainable outdoor lighting is efficient, increasing visibility and aesthetics and has as little as possible impact on the environment, human health and starry nightscape.

Sibylle Schroer is scientific coordinator of the working group "Light Pollution and Ecophysiology" at the Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB) in Berlin. In 2010, she joined the "Loss of the night" research project promoting inter- and transdisciplinary communication and establishing networks for research about light pollution. In 2017, she was granted the Galileo Award from the International Dark Sky Association (IDA) for her achievements. Since 2016 she is a partner in the EU-project STARS4ALL (H2020, 688135) and from 2012 until 2016 she has coordinated the European "Loss of the Night Network" (COST-Action ES1204). She has been working at the German Federal Research Centre for Cultivated Plants (JKI) and at the University of Florida (US). She made her doctoral degree at the Institute of Phytopathology, Kiel University. Her research interests are the impact of artificial light on ecosystems and measures for the protection of the insect fauna.



Sibylle Schroer
Scientific coordinator Department
of Ecohydrology at Leibniz
Institute of freshwater Ecology
and Inland Fisheries, Germany.

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Tuesday: Daylight & Architecture

Daylightful dynamics in Architectural Design

Tuesday, January 15 • 9:15 — 10:00

Natural light greatly impacts how a building is experienced by its occupants. It affects their well-being, notably from their health and biological clock perspectives, but also their perceived visual and thermal comfort, or their emotional response. If we want to support the design of places of delightful – and daylightful – living, we must bring these multifaceted considerations to become integral drivers of the creative process. This lecture will explore current research efforts aiming towards a deeper integration of daylighting performance in the design process, and enabling to create bridges between architectural design as well as other fields of science ranging from chronobiology and neuroscience, to psychophysics as well as computer graphics.

Marilyne Andersen is Full Professor at EPFL where she heads the Laboratory of Integrated Performance in Design (LIPID). Her research activities focus on the integration of building performance in design with an emphasis on daylighting around the themes of health, perception, comfort and energy. She is co-founder of the start-up OCULIGHT dynamics and Academic Director of the smart living lab. She was Dean of the School of Architecture, Civil and Environmental Engineering (ENAC) at EPFL from 2013 to 2018 and is on the Board of the LafargeHolcim Foundation for Sustainable Construction. She holds a MSc in Physics and a PhD in Building Physics, has been a Visiting Scholar at LBNL and tenure-track Professor at MIT where she founded the MIT Daylighting Lab in 2004. Author of over 100 scientific papers with several distinctions, she was the first laureate of the Daylight Research Award in 2016 and led the winning Swiss team for the US Solar Decathlon 2017 competition.



Marilyne Andersen
Professor of Sustainable Construction Technologies and Head of the LIPID laboratory at EPFL, Switzerland, Urban Systems (PLUS), EPFL, Switzerland.

Dynamics of Daylight

Tuesday, January 15 • 10:00 — 10:45

To evaluate the impact of daylight on human beings and support healthy lighting design, a proper and detailed description of daylight provision in the room and at the eye is required. At present, daylight planning considers a minimum daylight coefficient, a constant ratio, or the course of the daylight coefficient on a horizontal plane in the room. This ratio does not reflect the dynamics or absolute lighting levels, nor does it consider spatial light distribution. The correlated colour temperature (CCT) of the light is usually set to 6500 K, or colorimetric characterisation of daylight is based on measurements combining diffuse (skylight) and direct light (sunlight), even though research has shown that the spectral power distribution of specific regions of the sky can vary largely.

Martine Knoop is lecturer at the Chair of Lighting Technology, Technische Universität Berlin, Germany. In this role, she is responsible for research and education on indoor lighting, daylighting and colorimetry. After studying architecture and building physics at Delft University of Technology, she finalized her PhD in 2000, dealing with glare from windows and acceptance studies in rooms with daylight. Before taking up her assignment at the TU Berlin, she was a senior application specialist of Philips Lighting and part-time visiting professor at Eindhoven University of Technology, the Netherlands. Her current research focuses on the unique characteristics of daylight. It aims to promote and improve daylight design, as well as to develop new adaptive electric lighting solutions, to enhance user well-being and performance in interiors.



Martine Knoop
Lecturer and Chair of Lighting Technology at Technische Universität Berlin, Germany.

Daylight and Green Cities

Tuesday, January 15 • 11:15 — 12:00

In future cities, daylight will be the main energy supply for both natural and artificial energy production (e.g. photosynthesis and solar panels). Daylight is a source of information that determines the rhythm of plant, animal and human life inside and outside buildings; and thereby in particular also human health. Providing useful daylight is, therefore, an essential function of building facades as well as of urban nature, restricted by the surrounding urban morphology, with a strong seasonal component. At the same time, daylight is the basis for the aesthetic experience of both architectural (buildings and infrastructures) and landscape architectural designs (parks, gardens, public spaces, and greeneries) in a city. I will discuss the intersections of daylight urban design and green cities.

Christoph Kueffer is Professor of Urban Ecology at the Department of Landscape Architecture of the University of Applied Sciences Eastern Switzerland and senior lecturer (Privatdozent) at ETH Zurich. He studied Environmental Sciences at ETH Zurich, and completed his PhD in plant ecology and habilitation in plant and global change ecology at the same university. Christoph's research focuses on urban ecology, biodiversity conservation in novel and human-dominated ecosystems, and global change impacts on island and mountain ecosystems. In his research on urban ecology he collaborates with landscape architects, architects, urban and landscape planners, urbanists and horticulturalists on topics such as climate adaptation of cities, urban biodiversity, urban agriculture and ecological green space design. He currently co-leads together with an architect and an engineer a project on daylight and green cities.



Christoph Küffer
Professor of Urban Ecology, Department of Landscape Architecture, at the University of Applied Sciences Eastern Switzerland.

Wednesday: Daylight & Health

Ecosystems - Adaptiveness to Natural Light

Wednesday, January 16 •
9:15 — 10:00

Cycles of natural light and darkness structure the natural environment in an extremely reliable temporal pattern. This predictability provides opportunities for animals to organise key behaviours such as foraging, sleep, reproduction, migration, hibernation at seasonally appropriate times. Globally, there is a tremendous latitudinal and annual variation in the onset, duration and periodicity of biologically useful daylight, twilight and moonlight, making average daytime the longest around the Arctic Circle despite the facts that the Sun appears above the horizon for exactly half the time for every location on Earth over the course of the year.

Katharina Wulff is a scientist at Umeå University and associated researcher in neuroscience at the Wallenberg Centre for Molecular Medicine. She is a member of the Daylight Academy and a board member for the Society of Light Treatment and Biological Rhythms. Between 2007 - 2018 she worked at the University of Oxford, UK, where she was co-founder of the Oxford Sleep and Circadian Neuroscience Institute. She received a PhD in biology at the Humboldt University Berlin before she became a Marie Curie fellow at Imperial College London. Her early interest in animal behaviour led her to work with Prof Tembrock – a pioneer in behavioural biology at the Humboldt University in Berlin. Her current scientific approaches focus on how environmental light influences human physiology and behaviour. Combining this work with studies on the neuropsychobiology of mental health, her research aims to explore and better understand susceptibility and resilience to mental difficulties.



Katharina Wulff
Research Lecturer at Umea
University, Sweden.

Interindividual differences of (day-) light responses

Wednesday, January 16 •
10:00 — 10:45

Meeting the lighting needs is a fascinating challenge for our society. We have only just begun to fully appreciate the importance of daylight for health and well-being of humans. The built environment determines if and how light quality and quantity can be adjusted to inter-individual differences. Inter-individual differences influencing subjective (day-)lighting preferences, might be driven by factors such as chronotype, age, medical status, and others. They relate to all parameters of light reaching the human eye and are closely associated with general wellbeing, sleep, subjective comfort and health.

Lenka Maierová has a professional background in architecture. As a scientist she focuses on lighting and chronobiology as part of building physics, indoor environmental quality. Her domain is daylight, health, and integral lighting solutions. In her doctoral thesis, part of which was conducted in LESO-PB EPFL, Switzerland, she investigated the impact of light on people in regards to inter-individual differences. Since 2016 Lenka teaches young architects and civil engineers at CTU in Prague, Czech Republic. As the head of Platform for Healthy Lighting she is involved in several projects using high-quality lighting. This interdisciplinary platform aims to support students, researchers as well as the industry in investigating high quality lighting applications. It is a space devoted to acquiring and sharing knowledge with leading experts in lighting technology, architecture and design, biology and chronobiology, psychology, and other fields of science.



Lenka Maierova
Researcher at University Center
for Energy Efficient Buildings in
Prague, Czech Republic.

The Human Circadian Clock

Wednesday, January 16 •
11:15 — 12:00

The temporal structure of human biology inter alia is coordinated by a circadian system. The circadian system is involved in the regulation of the entire physiology, from gene expression to behaviours. Characteristically, the circadian system has an endogenous periodicity of only about 24 hours (circa-dian). Sunlight – rhythmic in sunrise and sunset – is the most reliable signal (Zeitgeber) for the human circadian system to keep it synchronised with the solar day. If this process is disturbed (by e.g. shift work), negative consequences for health can follow. The relevance of circadian biology in the realms of work, school and lifestyle choices, together with challenges to practical implementations of research findings under natural conditions will be discussed.

Thomas is Professor for Health Psychology, founder of 'SynOpus', co-initiator of ChronoCity Bad Kissingen, and founding member of the Daylight Academy (Velux Foundation). He obtained his PhD at the Ludwig-Maximilians-University Munich (LMU) (DE) focusing on health in shift workers and the impact of daylight saving time on sleep and circadian rhythms. In 2016, he finished his Habilitation at the LMU in Medical Psychology. After his PhD he worked at the University of Surrey (UK), the Charité Berlin (DE), and the University of Groningen (NL). In 2016 he started his own company 'SynOpus' (DE), and since 2018 Thomas is Professor at the University of Applied Sciences for Economics and Management (FOM) (DE).



Thomas Kantermann
Professor at the Institute for
Health and Social Affairs,
Institute for Empiricism & Statistics,
University of Applied Science
for Economics and Management,
in Essen, Germany.

Thursday: Daylight & Technology

Daylight & Energy in Buildings

Thursday, January 17 • 9:15 — 10:00

Solar energy can provide daylight, heating and cooling in buildings as part of the arrangement of windows and other components. This lecture will present the principles underlying the use of solar energy in buildings together with insights into innovations, new materials and system control. The challenges in achieving comfort and savings in artificial lighting whilst avoiding glare and overheating are discussed.

Professor Norton researches daylight, solar energy applications and energy in buildings. He led developments in new forms of highly insulating and switchable glazing. He has made key contributions to the thermal management of photovoltaics. He has doctorates from Cranfield and Nottingham Universities. He serves on the European Science Council Science Advisory Committee Energy Panel. He is an elected academician of the Royal Irish Academy and the Irish Academy of Engineering.



Brian Norton
President, Dublin Institute of
Technology, Ireland.

Power of Windows

Thursday, January 17 • 10:00 — 10:45

The building facade provides the aesthetic signature of a building, but it also provides important functions, such as visual contact with the outside, daylight provision, glare protection and solar gain management, which make the building usable and energy-efficient. These functions often oppose each other, so the selection and design of facade systems and their control for a certain building application should depend on those functions that the designer wants to promote to the detriment of the other functions. Movable shading devices or switchable elements are necessary in order to dynamically balance the different facade functions, which are of varying relevance, depending on the time of the day and season. To ground these theoretical concepts in concrete action, we will investigate design workflows for the evaluation and selection of fenestration systems, combining experimental techniques and simulation tools.

Bruno Bueno is the head of the team "Thermal and Daylighting Façade Systems" at the Fraunhofer Institute for Solar Energy Systems ISE. He received his PhD degree in Building Technology from the Massachusetts Institute of Technology (USA) in 2012. He is specialized in façade systems and urban microclimate research. Current research activities include the optical and thermal characterization and modelling of complex fenestration systems, as well as the evaluation of their performance in terms of daylighting provision, glare protection and solar heat gain management. Bruno Bueno is a founding member of the Daylight Academy and participates in various national and international forums on Daylighting.



Bruno Bueno
Head of the team "Thermal and
Daylighting Façade Systems" at
Fraunhofer Institute for Solar
Energy Systems ISE, Germany.

Sustainable Chemistry

Thursday, January 17 • 11:15 — 12:00

Daylight is a perfectly sustainable source of energy. However, its energy density is low and for technical use effective strategies for collection, upconcentration and storage of daylight energy must be applied. We discuss the state of different technical approaches for the conversion of light energy into chemically stored energy, their intrinsic benefits, limitations and challenges for implementation. We will also look at daylight as a reagent for chemical reactions and current applications in pharmaceutical and chemical industry. The technical basis for changing our society's energy source from fossil fuels to renewable solar energy becomes ready for broad use, but why is the implementation still slow? We will try to identify some of the major hurdles.

Burkhard König received his Ph.D. from the University of Hamburg. He continued his scientific education as a post-doctoral fellow with Prof. M. A. Bennett, Research School of Chemistry, Australian National University, Canberra, and Prof. B. M. Trost, Stanford University. Since 2000, he is a full professor of organic chemistry at the University of Regensburg. His current research interests are the development of sustainable methods in chemistry using daylight as energy input.



Burkhard König
Professor for Organic Chemistry,
Faculty of Chemistry and Phar-
macy, University of Regensburg,
Germany.

Further Reading

Changing Perspectives on Daylight: Science, Technology, and Culture. Science/AAAS, Washington, DC, 2017.

C. Reinhart 2014. Daylighting Handbook I: Fundamentals, Designing with the Sun. Building Technology Press, 200.

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J. Rockström et al. 2009: A safe operating space for humanity. Nature, 461, 472-475.

O. P. Judson 2017: The energy expansions of evolution. Nature Ecol. Evol. 1 no.6 , 0138

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Kräuter Hotel Edelweiss in front of mount Pilatus (Photo: Christine Bratrach)

Excursion

Excursion Architecture

Wednesday, January 16 •
15:15 — 17:30

We are going to visit the Rigi-Kaltbad Mineralbad and Spa where we can look at the extraordinary use of daylight in architecture. The internationally-renowned architect Mario Botta designed the bath close to the summit of mount Rigi, benefiting of a spectacular view over central Switzerland. He skilfully incorporated eight crystal-like, 3.5 meter-high skylight windows that bring daylight into the bathing complex below. Botta gave his creation the name "Giardino Minerale". During our excursion we will be accompanied by Ana Perucha, a local architect who will share her practical insights regarding this special design. At the location we will be given a tour by Uwe Gulde who will introduce us to the technical aspects of the construction.

Ana Perucha obtained her Masters in Architecture in Madrid and had worked for 6,5 years with Röösl-Mäder (ro.ma) architects in Lucerne. She is an enthusiastic design architect who is also fascinated with the use of daylight. Uwe Gulde is the Head of Technology & Bathroom Operations as well as member of the management board of the Aqua-Spa-Resorts AG.



Giardino Minerale (Photo: ©Aqua-Spa-Resorts)

Side Program

Snowshoe Hike

Thursday, January 15 •
20:00 — 21:30

After a delicious dinner we will put on our hiking boots and if there is enough snow we will strap them to snowshoes. This will allow us to walk in snow without sinking in and adventure into a beautiful winter wonder land. If the sky is clear, the light of the moon will accompany us on the hills of Mount Rigi. At the end of our hike we will be rewarded with a warming fire and a hot cup of Glühwein (mulled wine) a typical drink for the cold winter months in Switzerland.

Cultural Night

Wednesday, January 16 •
20:00 — 21:30

After our excursion we will be treated with a special dinner from the Kräuterhotel Edelweiss. To accompany it properly there will be an entertaining surprise activity during the meal. Afterwards we will engage in an intense group game filled with cultural references from all eighteen nationalities present. For this we ask you to bring something from your country to share with the group. It doesn't matter whether its something to eat, music, art or anything else that could be interesting for the other participants.



Bonfire at Summer School 2014 (Photo: ETH Sustainability)

Expert Rounds

Goal:

- The expert rounds serve the purpose of creating an in-depth discussion between you and the lecturers.

Procedure:

- After lunch, you will choose a partner from the entire group of students. Together you will have 30 minutes to prepare questions for the following round with the experts.
- For the expert rounds, three groups of students will have 20 minutes with each lecturer to address the previously prepared questions.

Learning Objectives:

- The importance of the preparation time lays in the critical reflection that you will undergo.
- You will have to summarize the knowledge presented to you during the morning inputs and establish its connections to other daylight related aspects.
- Think of questions that will broaden your understanding of the topic.
- Through the exchange of ideas with a student from a different background, you will become aware of diverse understandings of the same issues, which will widen your horizon of possible solutions.
- Even though questions for clarification and understanding can be asked, the main goal is for you to use the opportunity to feed your curiosity and dig deeper into the topic.



Expert rounds ETH Week 2018 (Photo: ETH Sustainability)

Workshop

Goal:

- You will develop prototypes of solutions for a sustainable city in which daylight is optimally used in terms of the environment, health, architecture and technology.

Procedure:

- During the afternoons, you will discuss, analyze and select specific daylight challenges of the urban environment.
- You will develop appropriate solutions for the selected challenges and develop prototypes for your outline of a sustainable city.
- Each team will design its city based on the group's experience, the expert inputs, and additional research. We will supply different materials for prototyping.
- On Friday morning, you will present your "Sustainable Daylight City".

Learning Objectives:

- Reflection on daylight challenges at the personal and group level.
- Gaining experience in transforming theoretical input into practical action.
- Developing a concrete urban and social context for implementing sustainable daylight solutions.
- Using this context to test and validate solutions against tradeoffs and unintended consequences.



Workshop ETH Week 2018 (Photo: ETH Sustainability)

Participants



Abel Sepulveda Luque
Spain

PhD Student in Dailight at University of Málaga, Spain.

I consider myself as a curious person about many things that surrounds me, that feeling drove me to have many different hobbies as singing, acting, dancing, longboard downhill, bouldering, learning foreign languages, traveling to new places. My leitmotiv is to enjoy little things in life while I research about energy efficiency.

Abel will be part of **Team C**.



Adam Bieniek
Poland

Bachelor Student in Architecture at Gdańsk University of Technology, Poland.

Student of Architecture and Drawing tutor. Interests in architecture and its impact, artistic and philosophical movies, photography, cycling, swimming and traveling, as well as culture of Middle Europe, Portugal and Italy.

Adam will be part of **Team E**.



Anastasija Popovic
Montenegro

Master Student in Electrical Engineering at University of Montenegro, Montenegro.

I am a 21-year-old electrical engineering student from Montenegro. I am currently doing specialization in Control and Automation at the University of Montenegro. I am particularly interested in smart grid technologies, the efficient and sustainable use of energy and possibilities that renewables offer. I hope to continue my studies in these fields. The Winter School seems to be the perfect opportunity to broaden my knowledge about daylight as an energy source but also about its impact on health, ecosystems and architecture. I enjoy working in an interdisciplinary environment because in that way I always learn something new and interesting I can use in my future work. I believe discussing and rethinking our ideas in an interdisciplinary environment will lead us to the best solution for any problem we are facing nowadays. Hence, I am really happy to be able to participate in this school where many disciplines gather. In my free time I like to cycle and dance salsa.

Anastasija will be part of **Team C**.



Ann-Simone Gerber
Switzerland

Master Student in Mechanical Engineering at ETH Zürich, Switzerland.

I am a student of Master in Mechanical Engineering at ETH. Since for ever I have a big and inherent interest and joy for nature and all related topics. I see my studies as an opportunity to (later on) participate in the development towards a more sustainable way of living our planet.

I currently live in Bern and next to my studies I like to spend time outdoors and move or else also to draw and paint. I like to meet, exchange, learn and laugh with other people.

Ann will be part of **Team A**.



Anna Krammer
Hungary

PhD Student in Solar Energy at EPFL, Switzerland.

Doctoral student in solar energy with background in chemical engineering and materials science. Main research on thermochromic thin films for novel switchable solar absorber coatings. Experience with vacuum processes, magnetron sputtering, a wide range of material characterisation techniques and teaching.

Anna will be part of **Team B**.



Aris Karabetsos
United States

Master Student in Light and Lighting at University College London, UK.

Post-graduate researcher at University College London focusing on lighting science related to design of the lit environment including daylighting design, lamp and luminaire technologies, the impact of light on the environment, architectural form and the human reaction to light. With over 5 years of experience working internationally in product management in the electronics and LED lighting industries, Aris has led new product design for more than 20 lighting technology components used in innovative applications all over the world. In his spare time, Aris is an avid poetry writer and enjoys hiking, mountain biking and skiing.

Aris will be part of **Team B**.



Camilla Stefanini
Italy

Master Student in Molecular Biology at Università degli studi di Padova, Italy and University of Zurich, Switzerland.

I am an Italian student of Molecular Biology, I am currently working on my master thesis at the Institute of Pharmacology and Toxicology in Zurich, my project focuses on a genetic tool to study the neurons that control the circadian rhythms in mammals. In addition to my passion for science, I love doing sports like running, swimming, cycling and climbing, moreover I like spending time travelling and playing piano. I am a very curious and dynamic girl who enjoys meeting new people, trying new experiences and learning new languages. Surely this Winter School will be highly interesting and an amazing learning opportunity for me.

Camilla will be part of **Team E**.

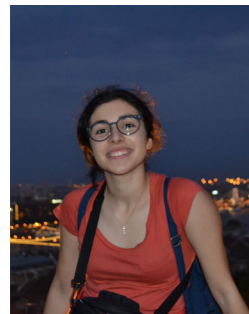


Céline Jenni
Switzerland

Bachelor Student in Food Science ETH Zurich, Switzerland.

I study Food Science at ETH and I am currently working on my Bachelor thesis. I am highly interested in Food, Health and Sustainability. I love cooking, reading books and doing creative things (painting, sewing). I also like sport (skiing, swimming, hiking) and to be in the nature. I love colours and therefore I always wear something colourful. My enthusiasm for colours is one of the reasons why I am interested in light (beside the importance for the nature and health of organisms and the use as a energy source) I am open-minded, cheerful and easy-going.

Céline will be part of **Team D**.



Claudia La Villa
Italy

Bachelor Student in Environmental Engineering at ETH Zurich, Switzerland.

I am an 18-years-old girl from Florence, Italy and since this September I study Environmental Engineering at ETH. I am very concerned about environmental issues and I would like so bad to do something in the future that can change the way humankind is behaving against nature and improve everyone's life. I am a friendly person who enjoys getting to know new people and I look forward to meet during this experience someone to exchange opinions and ideas about sustainability topics. I speak Italian, German and English and I am currently starting learning Spanish. I am also interested in art, I love seeing exhibitions and taking pictures, as well as spending time in nature. I have been swimming for 12 years and took part in regional and national competitions.

Claudia will be part of Team C.



Ethan Harradine
United Kingdom

Bachelor Student in Environmental Science and Public Policy at Harvard University, United States.

I am a second year undergraduate student at Harvard University studying Environmental Science and Public Policy. I am originally from the UK but have recently lived in Kuwait, Switzerland, Austria and currently in the USA. I enjoy traveling, running, playing the piano and spending time with my family. In the future I would like to be a British diplomat focusing on environmental issues and climate change.

Ethan will be part of Team D.



Eva Costard
Germany

Master Student in Management at Witten/Herdecke University, Germany.

My name is Eva and I am studying a Management Master at Witten/Herdecke University in Germany with a focus on CSR. Within my Bachelor degree in Business Economics I have already majored in «Economic Policy and Sustainability» with semesters abroad in Mexico and Japan. In 2014, I was part of the organising team of the oikos Winter School on the Topic «What is change?» and have been an active member ever since. During my internships I have gained practical experiences in the field of CSR and Sustainability at Deutsche Bank AG and innogy SE. In my spare time I work as a voluntary seaman onboard the Sail Training Ship «Alexander von Humboldt» to educate youth about traditional seamanship and enhance their team building skills. During the Winter I study nautical sciences part time to become a captain one day. Besides sailing, I like playing the piano, horse riding and skiing.

Eva will be part of Team C.



Geraldine Quek
Singapore

PhD Student in Architecture and Sciences of the City (EDAR) at EPFL, Switzerland.

Geraldine Quek is currently developing her PhD thesis at the Laboratory of Integrated Performance in Design (LIPID) in EPFL while enrolled in the Doctoral Program in Architecture and Sciences of the City (EDAR), studying the intersections of human perception of visual discomfort and visual interest. Geraldine obtained her B.Sc and M.Arch with distinction in the Singapore University of Technology and Design (SUTD), where she also worked as a research assistant in the Design for Climate and Comfort Lab, studying regional daylighting preferences in the tropics to establish daylighting and visual comfort standards in Singapore. She has since published papers on the calibration and validation of daylighting simulation models based on short-term visits in offices and residential buildings, and relating annual illuminance data to subjective user satisfaction of daylight. Geraldine has also won several awards throughout her academic career, including an Academic Excellence Award and is currently supported by the prestigious SUTD Graduate Merit Scholarship.

Geraldine will be part of Team D.



Isabel Campo Jurado
Spain

Master Student in Atmospheric and Climate Science at ETH Zurich, Switzerland.

I am a Spanish Master student currently enrolled on the Master Atmospheric and Climate Science at the ETH, with a Bachelor in Physics. I love interdisciplinary projects and am personally concerned with the issue of sustainability.

Isabel will be part of **Team A**.



Isabelle Kuster
Switzerland

Master Student in Food Science at ETH Zurich, Switzerland.

I am studying food science at ETH Zurich and doing my major in food processing, whereas I am especially interested in the potential of alternative protein sources like microalgae. Besides that, I am working as a bicycle courier and as a ski instructor for children in school camps. I like spending my free time in the Swiss alps for biking, skiing and kitesurfing.

Isabelle will be part of **Team B**.



Kirthan Shekar
India

Bachelor Student in Architecture RV College of Architecture (affiliated to Vishwshvaraiah Technological University), India.

People find me inspiring in terms of how to the point I am. Though I am soft-spoken I strongly believe in Community based Participatory activities. As a part of a country with a multitude of Eastern socio-cultural facets, I am trying my best to understand the western culture and how it influences the entirety of design thinking. To add to it, I also am interested in Landscape Photography to capture the light of different places. To sum it up, I describe myself as a passionate student trying to explore sustainability in urban and landscape design.

Kirthan will be part of **Team B**.



Leila Eppenberger
Switzerland

Master Student in Health at ETH Zurich, Switzerland.

I am Swiss and Italian, born in Basel. I studied Medicine and I worked as a resident in the eastern part of Switzerland. Currently I am a Master student in Health Sciences and Technology with a focus on Interaction between Human Health, Environment and Nutrition.

I enjoy traveling and being outdoors. I love to interact and work with other people from all over the world. My hobbies are swimming, singing, drawing and yoga. And my biggest love is sailing.

Leila will be part of **Team E**.



Lorna Flores Villa
Mexico

PhD Student in Daylight and Health at University College London (UCL), UK.

My name is Lorna, born and raised in Veracruz, Mexico currently living in London. I worked for two and a half years as an industrial designer in Mexico City, while doing so my interest in Light began, so I decided to look for a specialisation in lighting. In 2014 I moved to London to study the MSc in Light and Lighting at University College London(UCL) and since then my interest for the lit environment and its impact on human beings has grown. Currently I'm starting my 3rd year of PhD at UCL, hoping everything goes as planned...

Lorna will be part of **Team A**.



Maria Espinosa
Mexico

Master Student in Architecture at Instituto Superior de Arquitectura y Diseño de Chihuahua, Mexico.

I consider myself a cheerful person with a positive attitude to any situation and aware that all good and evil came from the perception of oneself, so I prefer to question my opinion before believing that I am right.

Maria will be part of **Team B**.



Marnix van de Sande
Netherlands

Bachelor Student in Biology at Utrecht University, Netherlands.

I am a broadly interested biology student from the Netherlands, who is taking a gap year between bachelor's and master's degree. Currently I am living in Switzerland and interning at a research group of the University Hospital Zürich, where I work on the pathogenesis of Inflammatory Bowel Disease.

In my free time, I can usually be found outside, hiking, running, climbing or taking photos, and back in the Netherlands I led a scout's group on a weekly basis.

Sustainability has long been a theme I am particularly passionate about, and I hope to combine sustainability and biology in my future studies. The winter school on daylight is therefore a very nice opportunity to further discover my interests and learn about an interdisciplinary topic together with a diverse group of students.

Marnix will be part of **Team A**.



Marta Benedetti
Italy

PhD Student in building automation considering non-visual effects of light at EPFL, Switzerland.

I am an Energy engineer in my second year of PhD in the Solar Energy and Building Physics Laboratory in EPFL, Lausanne. Besides science and research, my main interests are sports: skiing, cycling, triathlon, sailing.

Marta will be part of **Team E**.



Martin Rydving
Sweden

Master Student in Architecture at KTH Royal Institute of Technology, Sweden.

I am an architecture student, 24 years old, from Norway/Sweden. Born in Sweden, I grew up and lived most of my life in Bergen, Norway, with Swedish parents and my brother. I moved to Stockholm for my studies after having lived for a year in Beijing. Before my exchange to Zurich I have done exchanges also in Paris and Munich.

I like warm weather and cold weather. I like to be outside and to be inside. I like to listen and also to talk. I like to work hard and I like to relax. I like the darkness of the night and of course I like daylight ;)

Martin will be part of **Team C**.



Maryam Khatibi
Iran

PhD Student in Architecture at Politecnico di Milano, Italy.

I am originally from Iran based in Graubünden, Switzerland with my family. I have a 4-year-old daughter. I am a PhD candidate in architecture in the second year at Politecnico di Milano. My interest and expertise is on housing and passive environmental design. My native language is Persian. I speak English and German. My hobbies are painting, photography, hiking.

Maryam will be part of **Team A**.



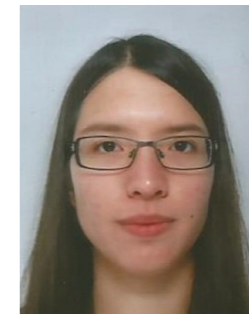
Neha Mehendale
India

Bachelor Student in Physics at Fergusson College, Pune, India.

I am a final year undergraduate student trying to study Physics. Being born in a country with one of the largest variations in biodiversity and geography really puts into perspective the delicate balance of nature and the need for its conservation. I am deeply committed to a sustainable path for development in India specifically in renewable energy development.

I love interacting with people from different cultural backgrounds because it helps broaden the mind and see things differently. I also really enjoy watching films from a different era for the same reason. I guess the ultimate goal is to be a lifelong learner.

Neha will be part of **Team C**.



Noémi Brunschwiler
Switzerland

Bachelor Student in Earth Science at ETH Zurich, Switzerland.

Hello! My name is Noémi and I am 21 years old. I come from Switzerland (Geneva more precisely) and I am currently a 3rd year bachelor student in Earth Science at ETH. Later, I want to do a master in an interdisciplinary field, maybe combining natural and social sciences. I am a really curious person and I like to make new experiences and meet new people. I can speak three languages (French, English and German), plus I am learning a little bit of Spanish. In my free time, I like to do sports (I joined a rowing team last semester) and to go to the movies, theatre, or music concerts. I also like to travel and my goal for next year is to move to Vietnam for 6 months to learn the Vietnamese language and get to know the culture.

Noémi will be part of **Team B**.



Rikaad Laloo
Trinidad and Tobago

Master Student in Lighting Design at University College London, UK.

I am a MSc student at UCL pursuing the Light and Lighting program. I am from Trinidad and Tobago, quite outgoing, friendly and I enjoy a night of drink and conversation.

I am here as much to learn about daylighting as well as network. I hope to complement my MSc with this one week course and learning from some brilliant persons in other work environments.

Rikaad will be part of **Team D**.



Sabine Python
Switzerland

Master Student in Integrated Building Systems at ETH Zürich, Switzerland.

Hi there, I am a master's student in Integrated Building Systems at ETH Zürich. I am interested in distributed Urban Energy Systems, i.e. how to supply our cities with energy and how to use it in a sustainable way.

Sustainability is not just a fancy & trendy word for me but a life-style. I am vegetarian and ride on my bike through the whole city. And because cycling for my daily needs is not enough, I have been working as a bike messenger for several years. Beside that I am also active in the LGBTQ+Community as the president of L-Punkt, the student organisation for lesbian, bisexual and queer women* in Zürich.

To refresh my mind, I enjoy cooking, drinking Belgian beer, fiddling with bikes and watch movies, but not all at the same time ;)

Sabine will be part of **Team E**.



Vivian Tunn
Germany

PhD Student in Circular Economy at Delft University of Technology, Netherlands.

I am a PhD candidate in my third year at TU Delft in the Netherlands. Originally, I am from Germany but I have lived in several different countries during the last few years.

My educational background is a Bachelor's degree in Business Administration and Services Marketing. Afterwards, I completed an interdisciplinary MSc in Innovation and Technology Management at the University of Bath with a master project focusing on sustainable innovation of companies. My current PhD research is focused on how business models can lead to sustainable consumption in the context of the circular economy.

I am passionate about having a positive impact on people and the Environment. My free time I am spending on sports, learning new languages and spending time with friends from all over the world.

Vivian will be part of **Team D**.



Yujie Wu
China

PhD Student in Daylighting simulation and control at EPFL, Switzerland.

PhD student from EPFL working on automated shading control for occupants visual comfort.

Yujie will be part of **Team E**.

Workshop Teams



Yuliia Zalomaikina
Ukraine

Master Student in Integrated Urbanism and Sustainable Design at University of Stuttgart, Germany.

Yuliia (*1993, Kyiv, Ukraine) held her MSc in Architecture from the Kyiv National University of Construction and Architecture in 2016 and completed STUDIO#1 postgraduate program at CANactions School for Urban Studies (Kyiv, Ukraine). As a professional, she is focused on urban regeneration and informal urban development. Working as an architect and researcher, Yuliia participated in the projects of various scale (from 1:1 construction to the city planning). In 2016-2018, she worked as an Architect and Project Leader at Zotov&Co architectural bureau in Kyiv, Ukraine, focusing on the re-use of post-industrial buildings and urban areas. During her work as a Coordinator of the International Architecture Festival CANactions 2017, she gained experience in the organization of public events in the field of architecture and urbanism. In 2018 Yuliia joined the Integrated Urbanism and Sustainable Design Master program at the University of Stuttgart.

Yuliia will be part of **Team D**.



Ziyi Wei
China

Bachelor Student in Environmental Studies at National University of Singapore, Singapore.

Hi, my name is Ziyi. Most of my friends prefer to address me with my English name Chris as they always associate my Chinese name in English spelling with the famous female Chinese celebrity Zhang Ziyi. So Ziyi or Chris, you name it :) I have lived in all the major Chinese-dominant societies. My home country is China, and I am currently studying in Singapore. I previously studied in Hong Kong for two consecutive summers, and I also visited Taiwan once. If you have any questions regarding Chinese culture, feel free to ask me. And I would love to have a conversation with you. I am always fascinated by other cultures, too. Please also share with me your stories. As a student majoring in Environmental Studies, I aim to promote corporate sustainability in the future. I really cannot wait to meet all of you in the sustainability winter school!!!

Ziyi will be part of **Team A**.

Team A

Ann-Simone Gerber
Isabel Campo Jurado
Lorna Flores Villa
Marnix van de Sande
Maryam Khatibi
Ziyi Wei

Team B

Anna Krammer
Aris Karabetsos
Isabelle Kuster
Kirthan Shekar
Maria Espinosa
Noémi Brunschwiler

Team C

Abel Sepúlveda Luque
Anastasija Popovic
Claudia La Valle
Eva Costard
Martin Rydving
Neha Mehendale

Team D

Céline Jenni
Ethan Harradine
Geraldine Quek
Rikaad Laloo
Vivian Tunn
Yuliia Zalomaikina

Team E

Adam Robert Bieniek
Camilla Stefanini
Leila Eppenberger
Marta Benedetti
Sabine Python
Yujie Wu

Organization Team



Christine Bratrich
 Director of ETH Sustainability
 Curriculum development &
 overall responsibility

Dr. Christine Bratrich accepted the position as director of ETH Sustainability in October 2008. She reports directly to the ETH president. Interdisciplinary research and applied projects on the topic of sustainability as well as interactions with interest groups in business, politics, and NGOs have characterized her career. Before, she completed her PhD at ETH Zurich and Eawag where she worked on key elements for successful river restoration projects. From 1997-2001, she was part of the project management of the Eawag project on «greenhydro».



Bernhard Wehrli
 Professor at ETH
 Curriculum development

Prof. Bernhard Wehrli studied chemistry at ETH Zurich and sanitary engineering and water protection in an ETH graduate course. In 1987 he finished his Ph.D. in the group of Werner Stumm. He had the opportunity to spend one year as a postdoc at Caltech in Pasadena and additional time as a guest scientist at universities in Paris, Toulouse and Jerusalem. He was a member of the research council of the Swiss National Science Foundation and of the Eawag directorate. Advancing interdisciplinary collaboration in teaching and research is the most important challenge in his daily business.



Luzia Fuchs
 Administrative Assistant for ETH
 Side program

After a higher education in business administration and positions in human resources and finance, Luzia Fuchs has been working part time as an administrative assistant at the ETH since 1998. As a second field of activity she works with horses runs a horse boarding house. The combination of professional experience and experience with horses complements each other and contributes communication skills, teamwork and "one's own initiative".



Isabelle Castagna
 Projectmanager at ETH
 Sustainability
 Workshop

Isabelle joined ETH Sustainability in May 2018. She holds a master in Geography from the University of Zurich. After her studies she was part of a restoration project team for former diamond mines at the environmental department of Namdeb Diamond Corp. in Namibia. At following positions, at RMS she analysed global building portfolios in terms of potential financial losses caused by natural hazard risks such as flood or earthquakes. At Bern-Lötschberg-Simplon-Bahn (BLS) she was in charge for key environmental and energy projects from conception to implementation. And at Zurich Insurance Switzerland, she build-up the new CR strategy for Zurich Insurance in Switzerland together with a small team.



Inés Tijera von Holzen
 Intern at ETH Sustainability
 Organization

Inés holds a bachelor's degree in International Relations from the University of Geneva and is now interning at ETH Sustainability. During her studies she focused on the political, economical and legal aspects of environmental issues. She was part of the committee of the student organization for sustainable development which set up the first Sustainability Week in Geneva. As co-founder of the Sustainability Week Switzerland she helped creating the largest swiss-wide student movement for sustainability.

Location

The ETH Sustainability Winter School 2019 will take place on beautiful Mount Rigi in the heart of Switzerland. There, we will stay at the Kräuter Hotel Edelweiss, which is known for cooking with almost exclusively local products and a spectacular view over the Swiss Alps.

The lectures, expert rounds and group work will take place in the seminar rooms of the hotel. We will be accommodated in the hotel restaurant for the meals and cultural activities.

Address: Kräuter Hotel Edelweiss
 Staffelhöhenweg 61, 6356 Rigi Kaltbad

The hotel is right next to the train station Rigi Staffelhöhe.



Kräuter Hotel Edelweiss during winter (Photo: Kräuter Hotel Edelweiss)

Contact

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Cover photo: Lensdrop