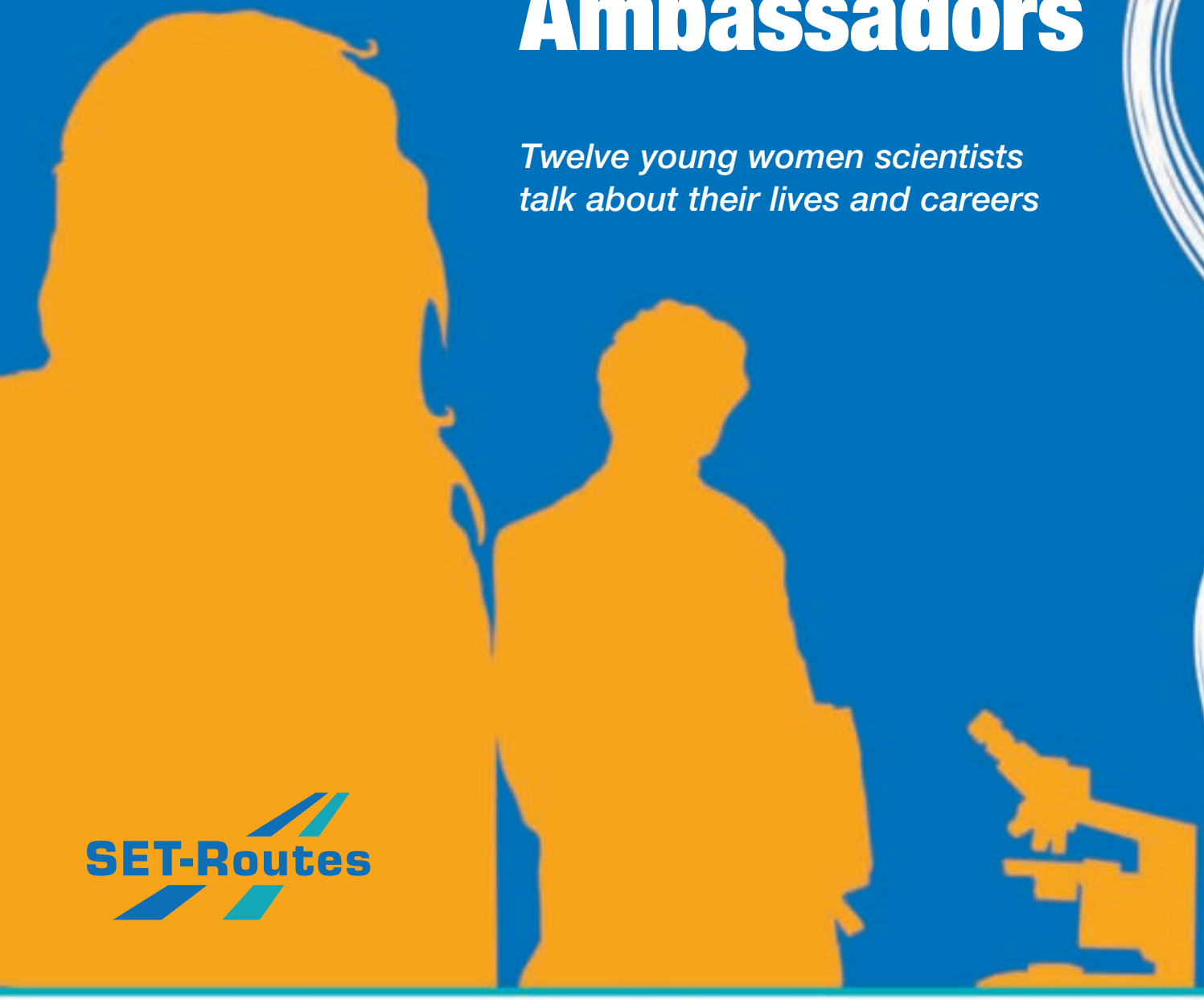
SET-Routes

School Ambassadors

Twelve young women scientists talk about their lives and careers



SET-Routes

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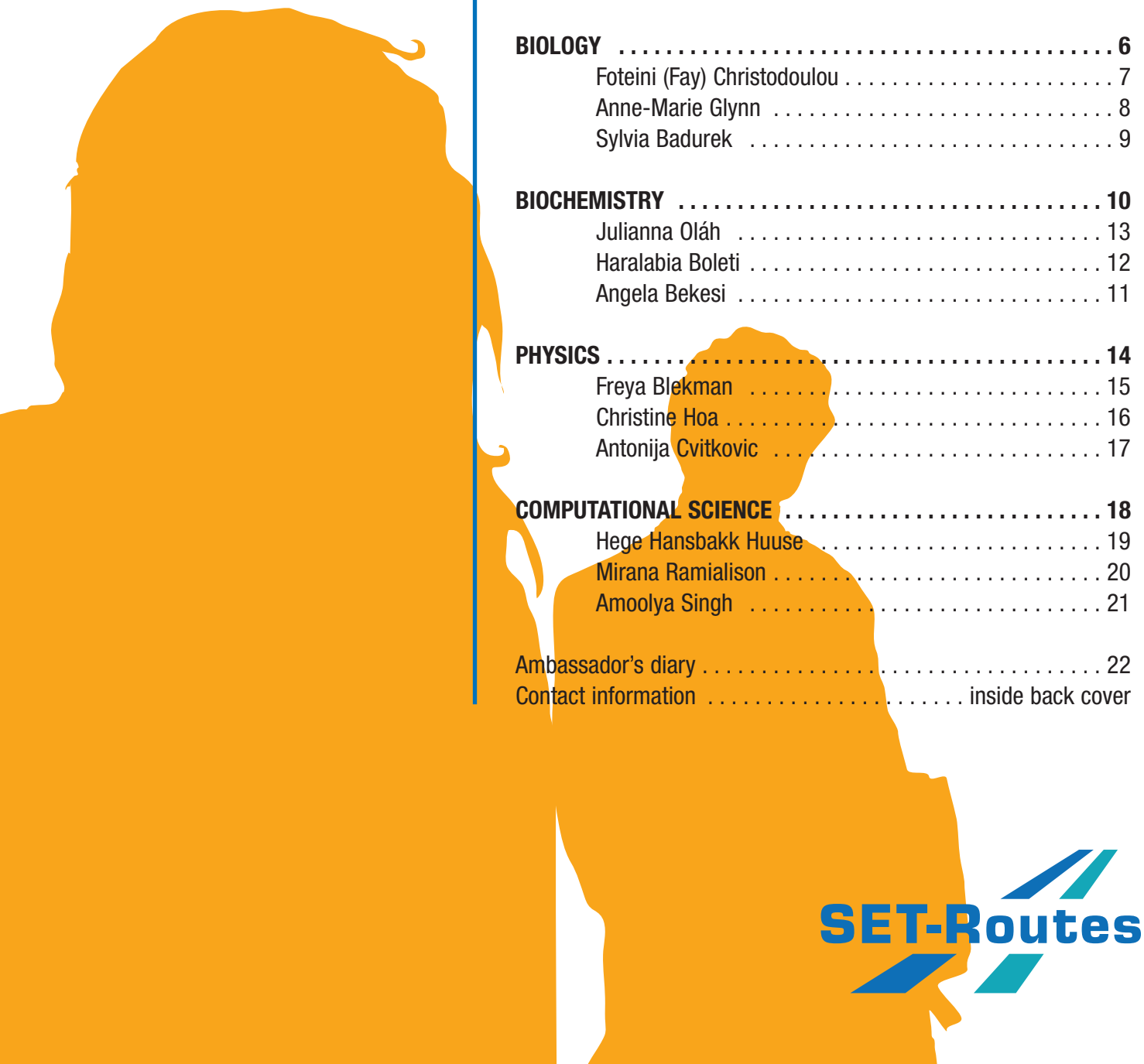


SET-Routes

Introduction

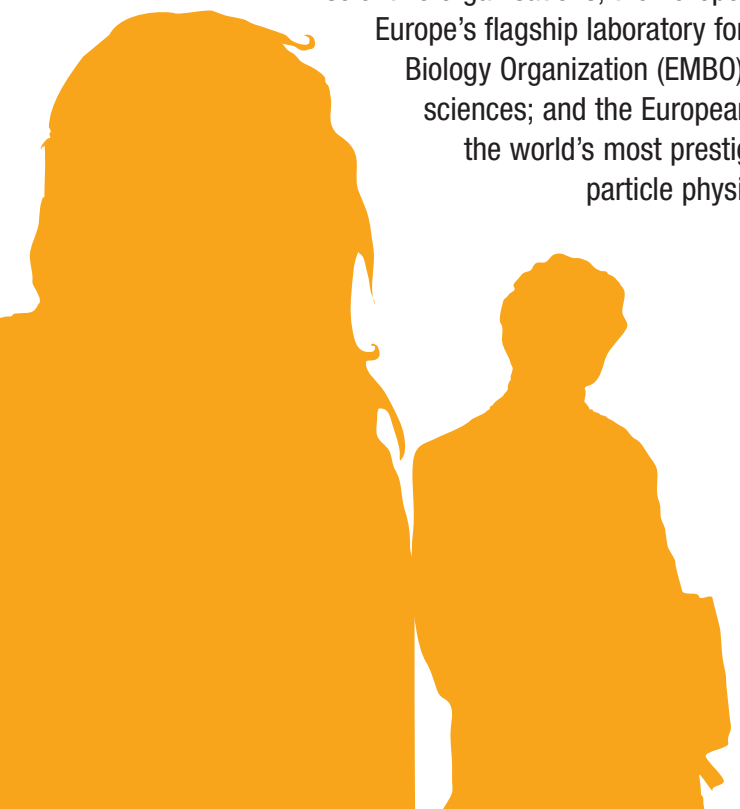
Science is important to future economic growth and continued prosperity in Europe. There are great opportunities for the high-school students of today to follow careers in science and be a crucial part of these future developments.

SET-Routes' aim is to encourage more girls to take up careers in science, engineering and technology (SET). The school ambassadors are young women who have successful careers in different fields of science from biology to medical imaging and physics to robotics.

The message from our 70 school ambassadors is that science is exciting, challenging and rewarding. In this brochure 12 of them talk about themselves and their careers with the hope of inspiring you to become scientists, too!

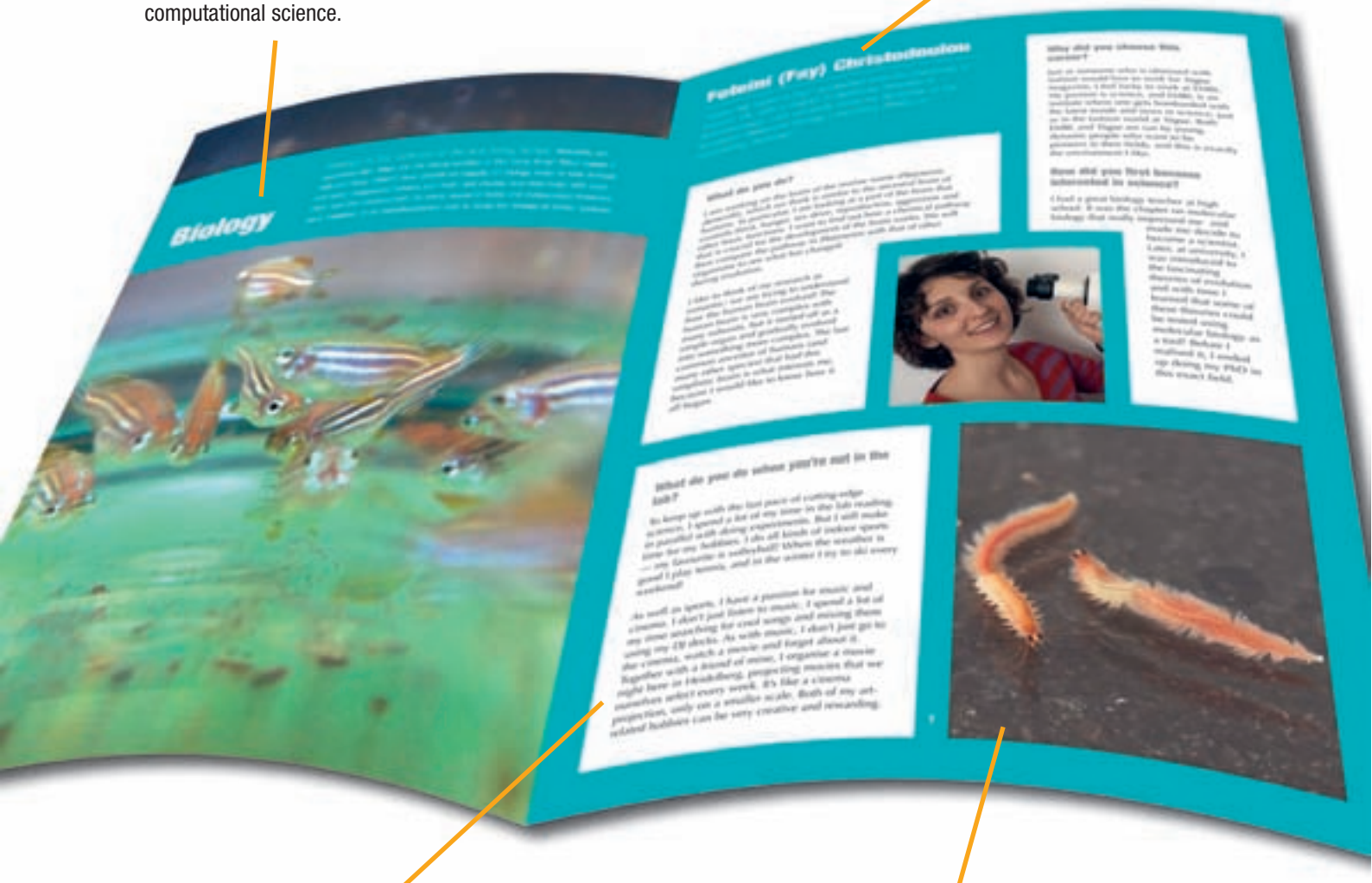
SET-Routes is the result of a unique collaboration between three of Europe's top scientific organisations, the European Molecular Biology Laboratory (EMBL), Europe's flagship laboratory for molecular biology; the European Molecular Biology Organization (EMBO), which promotes excellence in the life sciences; and the European Laboratory for Particle Physics (CERN), one of the world's most prestigious research centres. Over half the world's particle physicists use CERN's facilities.

Philipp Gebhardt
Julia Willingale-Theune



This handbook is divided into four themed sections: biology, biochemistry, physics and computational science.

Each ambassador has a page beginning with her job title, qualifications and at what stage she is in her career.



Here the ambassador talks about how she became interested in science, what level her career has reached so far, and what her day-to-day job involves.

A photo or image illustrates the ambassador's area of expertise.

What's in this brochure?

This handbook gives an overview of the lives and careers of 12 of the SET-Routes school ambassadors, all of whom are at an early stage of their careers and have volunteered to go to schools across Europe to talk about their work.

Biology

Biology is the science of life and living things. Biologists ask questions like: What are the characteristics of living things? What makes them different from each other? How should we classify them? Biology looks at how animals and other organisms behave and work, and studies how they react with each other and the environment. Its many research fields and independent branches work together to study the biology of whole systems.

Foteini (Fay) Christodoulou

"Hello! My name is Fay. I graduated from the University of Sussex, UK, with a degree in molecular genetics in Biotechnology. I am currently doing my doctorate at the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany."

What do you do?

I am working on the brain of the marine worm (*Platynereis dumerilii*), which we think is similar to the ancestral brain of humans. In particular, I am looking at a part of the brain that controls thirst, hunger, sex drive, reproduction, aggression and other basic functions. I want to find out how a chemical pathway that is crucial for the development of the brain works. We will then compare the pathway in *Platynereis* with that of other organisms to see what has changed during evolution.

I like to think of my research as romantic: we are trying to understand how the human brain evolved! The human brain is very complex with many subunits, but it started off as a simple organ and gradually evolved into something more complex. The last common ancestor of humans (and many other species) that had this simplistic brain is what interests me, because I would like to know how it all began.

Why did you choose this career?

Just as someone who is obsessed with fashion would love to work for *Vogue* magazine, I feel lucky to work at EMBL. My passion is science, and EMBL is an institute where one gets bombarded with the latest trends and news in science, just as in the fashion world at *Vogue*. EMBL is run by young, dynamic people who want to be pioneers in their fields, and this is exactly the environment I like.

How did you first become interested in science?

I had a great biology teacher at high school. It was the chapter on molecular biology that really impressed me and made me decide to become a scientist. Later, at university, I was introduced to the fascinating theories of evolution and with time I learned that some of these theories could be tested using molecular biology as a tool! Before I realised it, I ended up doing my PhD in this exact field.

What do you do when you're not in the lab?

To keep up with the fast pace of cutting-edge science, I spend a lot of my time in the lab reading, in parallel with doing experiments. But I still make time for my hobbies. I do all kinds of indoor sports — my favourite is volleyball! When the weather is good I play tennis, and in the winter I try to ski every weekend!

As well as sports, I have a passion for music and cinema. I don't just listen to music. I spend a lot of my time searching for cool songs and mixing them using my DJ decks. As with music, I don't just go to the cinema, watch a movie and forget about it. Together with a friend, I organise a movie night at EMBL, projecting movies that we ourselves select every week. It's like a cinema projection, only on a smaller scale. Both of my art-related hobbies can be very creative and rewarding.

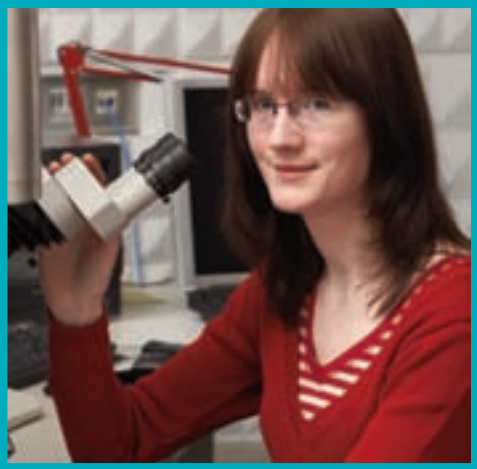
Anne-Marie Glynn

"I'm Anne-Marie from Ireland and I moved to do research at the European Molecular Biology Laboratory (EMBL) in Germany 3 years ago."

What do you do?

I'm working in an area called cryo-electron tomography — guess you haven't heard of that before?! It's basically photography in 3 dimensions — not like a movie but a photograph that you can enter into to explore not just the areas at the front but also deep inside the image. You can twist it around and view it from different sides to see things that have never been seen before. Really small things can be seen in this way with 50,000 times magnification!

Sometimes I joke with my friends that I spend my days watching diamonds — but in a way it's true. Our samples need to be cut into very small pieces and the only substance strong enough to do this is precious diamond. It's very sharp, so it's a little different to the diamond in your mother's ring. Following this, I use a microscope and a computer to study the sample. As our microscope can only make black and white pictures, I paint different areas to make it easier for others to understand the images.

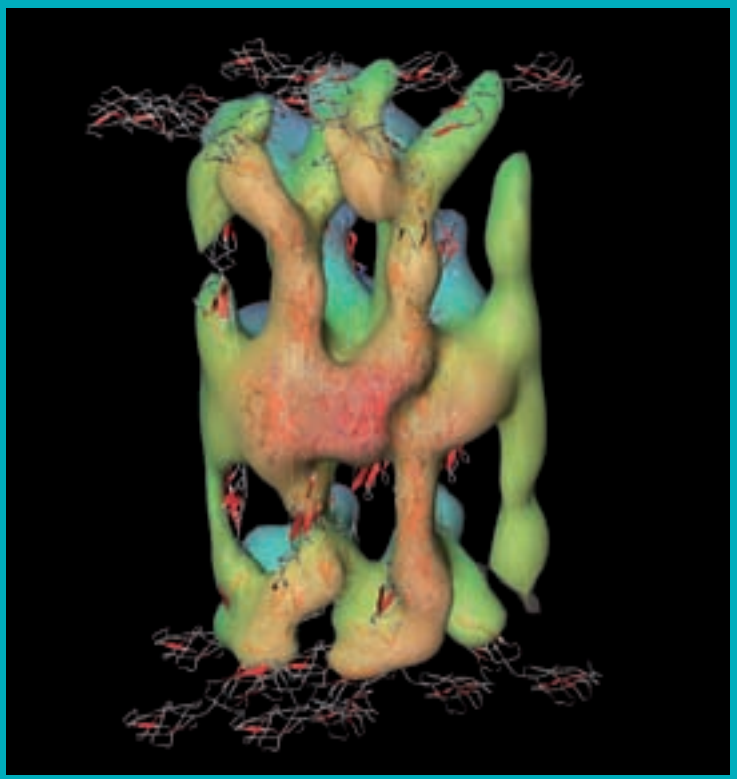


Which subjects did you enjoy at school?

At school I was interested in a wide range of subjects, so choosing a career was rather difficult. To postpone the decision I opted to study biotechnology at the National University of Ireland, Galway, as it included business and French in addition to a range of scientific topics.

What did you do next?

After receiving my degree, I was offered a job in a hospital lab checking patient samples to see if they had cancer or other diseases. However, I realised that I preferred learning in-depth about a topic, so that I and others could really understand what was going on. That's one of the great things about science. There are so many fascinating topics, but only 24 hours in each day, so scientists write about what they discover to explain to others about it. Then other scientists try to discover additional things. Bit by bit we can piece the entire story together — and although this can be a long process, at the end of the day it's rewarding to have been part of elucidating something completely novel.



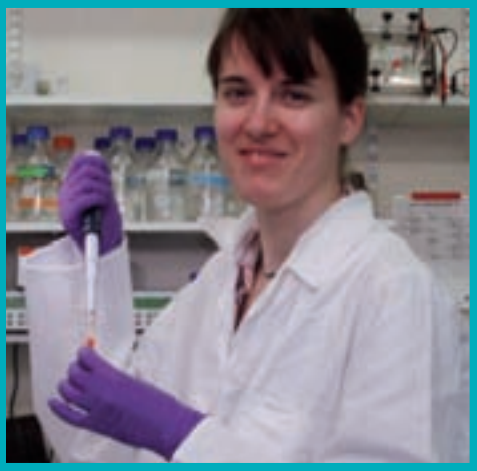
What do you do when you're not working?

Working in science is excellent if you enjoy travelling. Think back to how different people can be if you go abroad on holidays. Now imagine working with people from different cultures, with different hobbies and languages, and them becoming your friends. In general you can have the opportunity to travel all over the world to explain your work to other scientists.

In addition to the international atmosphere, I am extremely fortunate to work in an institute where famous scientific speakers come every week to share their ideas. Although we have busy days, scientists also know how to have fun. I enjoy doing pottery and I'm lucky to have good friends to hang out with, whether by the riverside, going for a cycle or watching a film.

Sylvia Badurek

"Hi! My name is Sylvia. I am 27 years old, originally from Austria, and currently in the final year of my PhD studies in molecular biology at the Mouse Biology Unit of the European Molecular Biology Laboratory (EMBL) in Monterotondo, Italy."



How has your career progressed so far?

I studied biology at the University of Vienna with specialisation in genetics. I spent my third year as an exchange student in Scotland at the University of Glasgow, which was a wonderful experience and prompted me to go abroad again for my PhD studies.

What is your area of interest now?

The main interest of our lab lies in studying the function of a receptor protein in the plasma membrane of neurons (nerve cells), which is important in controlling the development and survival of neurons as well as in the establishment and maintenance of specific connections between neurons. This is important for learning and memory processes. We hope that the results of our basic research will contribute to a deeper understanding of the molecular processes underlying learning and memory and, ultimately help to find a cure for neurological diseases such as Alzheimer's and schizophrenia.

Which subjects did you enjoy at school?

Actually, at age 10 I wanted to become a novelist, but this early passion for the fine arts was soon superseded by my interest in nature and science. I used to dry and collect plant leaves, could spend hours watching ant colonies and was reading my older brother's biology textbooks just for fun. OK, I confess this sounds a little bit odd, but these were the beginnings, and when we first learned about molecular biology in high school, I realised that what I really wanted to do was to find out how life works on a molecular level, and decided to become a scientist.

In reality, it was not such a straightforward way to get to that decision, because I knew from my father (who is a physicist) that the life of a scientist is not always easy. But my parents encouraged me to follow my interests and passions.

What do you do in a typical day?

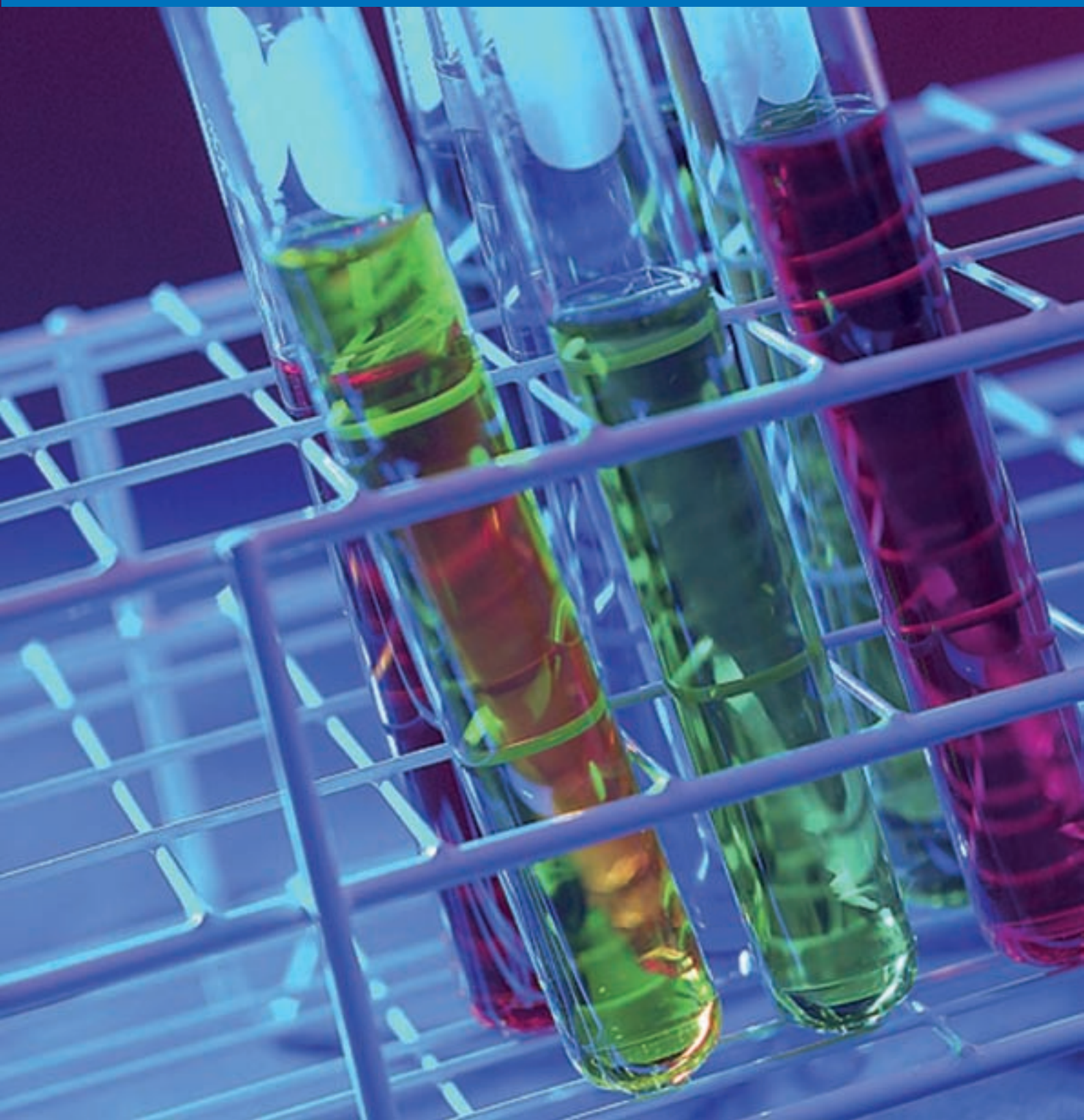
I've been working in a European research institute in a little town close to Rome for more than 3 years now. We are organised into research groups of about 10 people per group. Each group works on a specific subject and consists of PhD students and postdocs (young researchers who have finished their PhD, but do not have their own groups yet), who all have their own projects within a certain field of study, but who also collaborate with each other and people from other groups, and even other research institutes and universities.

Each group also has a technician, who helps the PhD students and postdocs with routine work, and of course a boss (the group leader), an experienced scientist who does mainly theoretical and administrative work. He or she plans the projects, giving advice to the students and postdocs on the experiments and organises the budget. As we all come from different countries, the main language spoken in the lab is English.

When I'm not in the lab, I love going to the cinema, meeting friends, reading books, playing basketball and travelling.

Biochemistry

Biochemistry is the study of the chemical substances and vital processes occurring in living organisms. Biochemists study the structure and function of cellular components such as proteins, carbohydrates, lipids, nucleic acids and other biomolecules.



Julianna Oláh

"I'm from Hungary and I work at the University of Bristol (UK) as a researcher in chemistry. I did my PhD at the Budapest University of Technology and Economics where I used computers to study small molecules. Recently, I received a fellowship from the European Union to study enzymes and what happens to drugs in the liver."

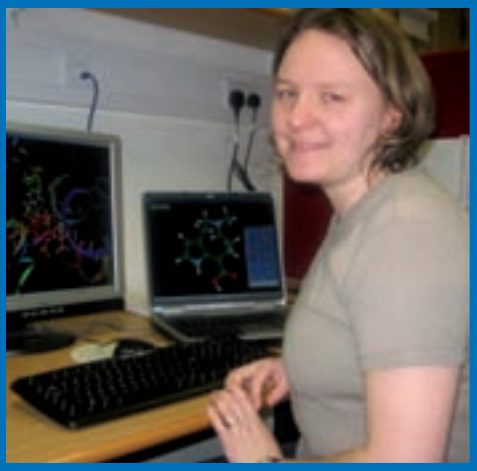
Why do you use computers to study molecules?

You may ask: "Shouldn't you be sitting in a lab doing experiments?" Over the last few years, computers and computer programs have become faster and more efficient. Compare, for example, your present mobile phone with the one you had 5 or 6 years ago — what a big difference! Thanks to research and development, we can use computers to solve chemical, physical and biological problems, and better understand the world around us: the greenhouse effect, global warming, the formation of galaxies and human ageing, to name a few.

What do you do?

I try to model how enzymes work. The body contains millions of enzymes which are essential to life; for example, in respiration or the digestion of food. The enzyme that I work on is found in the liver, where it gets rid of many drugs that we use as medicine to cure diseases. You can see an image of it below: the cartoons, lines and arrows show its structure. Each enzyme has an active site, where the chemical reaction takes place. This is usually a cavity buried in the enzyme. In this case, the active site is surrounded by the ring shown in white and several amino acids which are part of the colourful helices. We would like to 'see' what happens to drugs in this active site, how they move around and how the enzyme decides which part of the molecule to attack and alter.

There is another problem that I would like to investigate. This enzyme has many variants, and as a consequence, some people transform some drugs much more slowly than others. This can be a serious problem, as some people may need more or fewer drugs than others — what is healthy for one may be dangerous for another.
I hope that my contribution to this question will improve our understanding of how the body gets rid of drugs, and help develop safer ones.



What's the best thing about your job?

When I started to do research at the university in Budapest, I did not know it would change my whole life! At first, I went to Hungarian conferences with my results, but later I participated in international ones where I met fantastic people, both young and old.

Through my research I have worked in Belgium and now work in the UK, both really multicultural countries compared to Hungary. I have made lots of new friends from all over the world, and I have encountered new cultures and learnt new languages. Suddenly, the world is at my feet!

In my free time, I love playing with children (there are more than ten under 10 years old in my family!) and cooking (chemistry in the kitchen — using our imaginations to create new recipes!). And as a good meal is best served with a good drink, I collect beer labels with my boyfriend. We have more than 2,000 different labels in our collection!

Haralabia Boleti

"Hi, my name is Haralabia. I started my career as a chemist but was eventually won over by the chemistry of life and biology, so now I work as a researcher in biomedical sciences at the Hellenic Pasteur Institute in Greece."

What is your area of scientific interest?

I'm in a community of scientists who study pathogenic microbes and infectious diseases. For the past 12 years I've been studying bacteria, viruses and protozoan parasites, asking questions like: How do they attack and infect specific cells of the host organism? How do they escape the host's defense mechanisms? How do they manage to hijack and use physiological mechanisms of their host cells which are important for their own survival and multiplication?
I collaborate with national and international research groups which work on the same questions. These are very important questions in biomedical research, because they help scientists understand how infectious diseases are caused and provide them with the information and the tools needed to develop new drugs and vaccines.

How has your career progressed so far?

After graduating with a BSc in Chemistry from the University of Athens, I obtained an MSc in Biochemistry from the University of Alberta, Edmonton, Canada. After returning to Europe, I completed my PhD in Cell Biology at EMBL in Heidelberg, Germany, followed by a postdoctoral position at the Pasteur Institute in Paris.

For the last 6 years, I have been working in a tenure-track position at the Hellenic Pasteur Institute in Athens, which employs 80 scientists and specialises in biomedical research with particular focus on infectious diseases and public health. As a member of the Department of Microbiology, I am leading an independent research project focusing on the *Leishmania* protozoan parasite. I also supervise graduate students in their work, as well as running the light microscopy facility. On top of that, I am actively involved in organising microscopy courses for graduate students and researchers, and training courses for high-school biology teachers on a national and international basis.

What's the best thing about your job?

Being a scientist is one of the most fascinating and rewarding careers one can imagine. There is the never-ending intellectual stimulation and the fantastic opportunities to interact with colleagues around the world. It is really satisfying to feel that you are contributing to the advancement of knowledge in a particular field, both as part of a research group and as an independent scientist. Diversity and lack of routine are some of the advantages of being a researcher.

What do you do when you're not working?

Despite having a busy and stressful job, I do find time to practice my favourite hobbies: singing and dancing. I have a particular interest in latin dance, and once a week I enjoy the rhythms and steps of salsa and ruenda together with a group of friends! Greek folk music also fascinates me and I am a member of a small choir that explores the roots and melodies of traditional songs. Weekends are dedicated to going to the movies, seeing friends or hiking in the Greek countryside.

Angela Bekesi

"Hello, my name is Angela! I'm a molecular biologist at the Institute of Enzymology belonging to the Hungarian Academy of Sciences. I've just defended my doctoral thesis on uracil in DNA."

What do you do in a typical day?

Well, there is no typical day for me: science makes each day unique. My work is my favourite hobby! I travel a lot and meet interesting people. I also participate in events with my colleagues, such as trips away and even ping-pong championships.

A career in science allows for greater freedom, and is more family-friendly than many other jobs. My husband and I and our two little sons take advantage of this. The boys have already been introduced to science; Ambrus, at 3 years old, has already dealt with fruit flies and uses pipettes very expertly.

At home, I like painting, reading books, weaving, cycling, hiking and playing with my sons.

Why did you become a scientist?

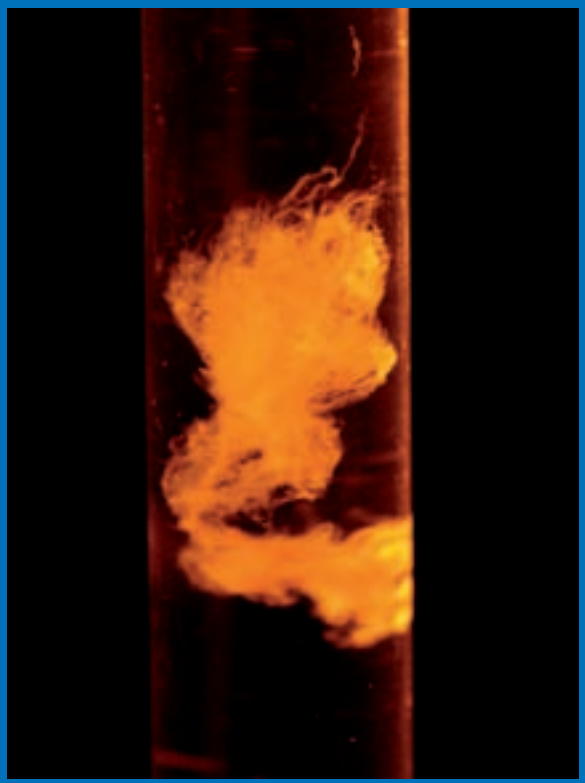
Actually, I didn't really choose science — science chose me. When I was child, I used to dream about one day being a famous scientist who saves the world. Later, I decided to become a teacher. My favourite subjects were chemistry, maths and art. I was also an active participant of a catholic youth community. In the end, I graduated as a teacher in chemistry and catholic theology. Then my supervisor offered me a doctoral fellowship, and I thought, why not?

Half of my dream has come true. Now my life is similar to an action movie; I'm never bored. Planning and performing experiments, trying to find the explanation for the 'why?' and the 'why not?' is real detective work. I'm sure that future applications of my results will be useful. At the same time, getting involved with SET-Routes has provided me with a great chance to teach, which I still enjoy.

What is your area of scientific interest?

The genetic code is made up of DNA, which is like a special text using four characters: adenine, thymine, guanine and cytosine. A fifth character, uracil, has the same meaning as thymine. However, if uracil appears in DNA, it is sensed as a mistake and is repaired by the DNA repair mechanism of the cell. If lots of uracil gets into DNA, it can lead to programmed cell suicide. This is quite important in anti-cancer drug design, because the death of tumour cells can be induced by introducing uracil into their DNA. In some cases, however, uracil in DNA may serve as a signal for different physiological processes, such as the development of antibodies. Uracil-DNA signalling may be also involved in the metamorphosis of insects.

I work with fruit flies and have successfully identified a new protein (never known before!) which might be responsible for sensing this uracil signal. The protein seems to be involved in the death of larval tissue, a process which finally allows the fly to emerge from the pupae. This protein may be a useful tool for molecular biology or anti-cancer therapy, and a good target for fight against pest insects, such as mosquitoes which spread malaria.

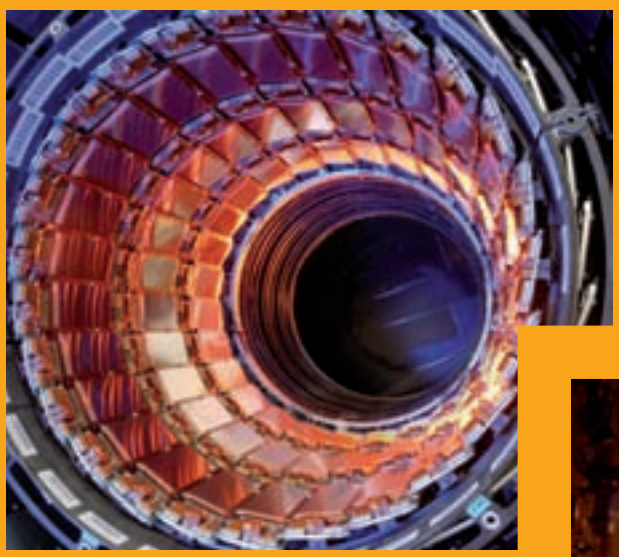


Physics

Physics is the study of matter and fields, and how they interact to produce the great variety of phenomena in nature. Physicists study very large things, like stars and galaxies, and very small things, such as atoms and their constituents. Their ultimate goal is to understand the universal laws that define the fundamental structure of the universe.

Freya Blekman

"Hello everyone, my name is Freya. At the moment, I am working as a physicist for Cornell University in the United States, but effectively I am stationed at the European Organization for Nuclear Research (CERN) in Geneva, Switzerland."



What is your area of scientific interest?

My specialisation is elementary particle physics, which is a field in physics where we use big accelerators to understand very small particles. The elementary particles I am interested in only exist for a very short time — a billionth of a billionth of a second. It turns out that such particles existed a fraction of a second after the 'big bang'. This essentially means that we are looking back to what happened over 13 billion years ago, and we're trying to understand how everything around us ended up as it is today.

The actual day-to-day work is fun and varied. I travel a lot and I do something different every day — I really enjoy that. One day I might be putting together a new detector with a screwdriver or soldering iron, while the next day I might be calculating and checking physics calculations or writing computer programs to analyse the data from the accelerator. Being a particle physicist is also a great way to move abroad: I lived in Chicago during my PhD, then in London for a few years, and now Switzerland. But one of the best things about my profession is that we work in international teams and are doing groundbreaking research. This involves a lot of team work and communication, something most people don't immediately expect when thinking about physics.

What's the best thing about your job?

As a scientist, I learn something new every day, and I expect that it will be like that for the rest of my career. At CERN, I am fortunate enough to work with some of the smartest people in the world. This is very special: when you're doing science you find out that it doesn't matter whether you come from Abu Dabi, Adelaide, Amsterdam or Arkansas. We all work towards a common goal: understanding the building blocks of matter!

What do you do in your spare time?

Geneva is a great town. I love skiing, and it's very easy to get to the mountains for an afternoon or weekend of snowy fun. In summer I go hiking, sailing or have a picnic in one of the many parks on the Geneva lakeside. Summer in Geneva also means that there is some kind of festival each weekend — I love going to see live music, and when I was living in Amsterdam I was a 'regular' at some of the famous 'rock temples'. I have also played hockey all my life. There's only one ladies league in the entire country, so you could say I play 'premier league' hockey! Finally, I'm a member of an international running club.

How has your career progressed so far?

I grew up in Amsterdam, where I also went to university, studying experimental physics at the Universiteit van Amsterdam. During the last year of my MSc degree, I was fortunate enough to spend a summer on the student programme at CERN in Geneva. I really enjoyed it and it gave me a very good idea of what research in particle physics was all about. I then jumped at the opportunity to do a PhD at the Dutch National Institute for Particle Physics.

During my PhD, I spent a few years in the United States at the Fermi National Accelerator Laboratory, near Chicago. There I studied the properties of the top quark: the heaviest elementary particle currently known (it weighs about the same as a gold atom, which is not that much until you realise that a gold atom contains hundreds and hundreds of elementary particles). After my PhD, I was hired by Imperial College London to work on the Compact Muon Solenoid project at CERN, which happened to be the same project that I worked on as a summer student.

Christine Hoa

"My name is Christine Hoa, I am 31 years old and I work as a mechanical engineer at the French Atomic Energy Commission (CEA) in Grenoble."

What do you do?

At the moment, I am designing and testing technologies for very low temperatures — minus 269°C! Why so cold? Because we have to generate a high magnetic field and only superconductive magnets can do this, and superconductive magnets only work properly when cooled to -269°C. The high magnetic field will confine a very hot region where particles can combine and then produce energy, called "fusion energy". It's a challenging technology that could solve the inevitable problem of the depletion of fossil fuels, such as coal and gas. It is very exciting to take part in a scientific project that could change the way we live.

Engineering research is never boring: you learn something new every day, as the field evolves through continuous innovation. My time at work consists of reading, running computing models, discussing results with my colleagues and travelling to meet the different partners of the project. Engineering involves a lot of human interaction. Team work is very important. You get to know friendly people from many different countries and cultures. It's a stimulating environment that I really appreciate.

How did you get into science?

The first time I found science exciting was when I visited the Palais de la Découverte science museum in Paris. I was simply fascinated by the stars in the planetarium, and I was literally electrified when I volunteered to experience electrostatic forces, which made my hair stand on end! Since then my interest in science has never stopped growing.

I graduated from the French engineering school, ENSMA in Poitiers, with a degree in mechanics and aeronautics. I also have a PhD in engineering sciences, with a specialisation in space science. For several years after my PhD, I worked on the design of satellites which provide television and mobile services to households throughout Europe. Then I worked for 2 years at the European Organization for Nuclear Research (CERN), where I was involved in the design of super-conducting magnets for the biggest particle accelerator in the world — the Large Hadron Collider. From CERN, I moved to Grenoble where I took up a research position at CEA. As an engineer, you have a huge range of job possibilities!

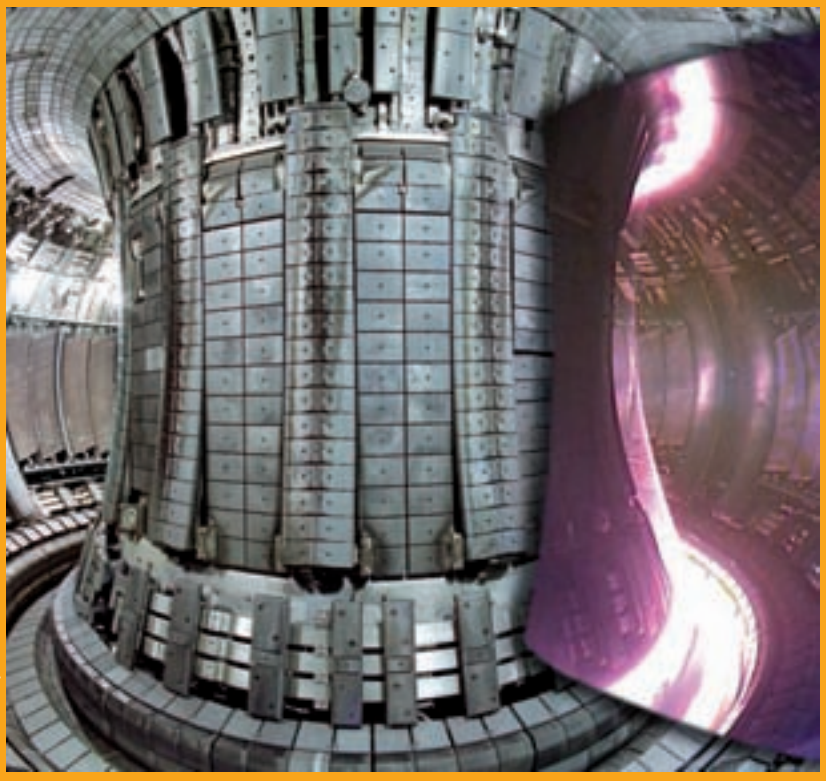


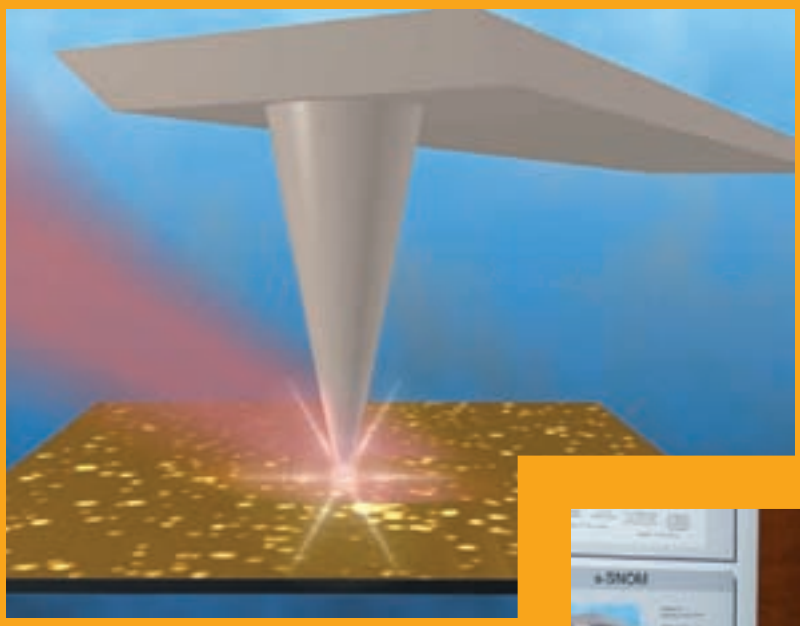
Photo: EFDA-JET

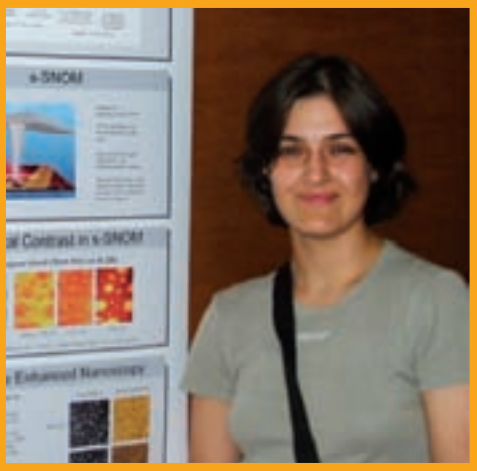
What do you do when you're not working?

At the weekend, I like going to the mountains. I go hiking in summer and skiing in winter with friends and family. I have also learnt to paraglide. It is just fantastic to be able to fly over the beautiful Alpine landscape! I also have time to travel abroad for leisure. I have been trekking in Bolivia and in Nepal, and I had a wonderful time with my friends discovering these countries.

Antonija Cvitkovic

"My name is Antonija Cvitkovic: I am 31, a physicist by training, a curious explorer and a dreamer by nature."





What do you do?

At the moment, I am a final-year PhD student working in the exotic field of near-field optics. My project is focused on the investigation of nano-particles using high-resolution scanning near-field optical microscopy. I'm a member of the nano-photonics research group at the Max Planck Institute of Biochemistry in Munich, Germany.

Living and working in Munich is great: in addition to having the best beer, this multicultural city is one of the biggest centres for research in nanobio-technology. The Max Planck Institute is an excellent place for students who want to learn by doing. We also have a particularly rich spectrum of seminars given by leading researchers.

I attend scientific conferences, workshops and summer schools, as well as parties organised by the student network. Since science is pretty dynamic nowadays, you have to work hard and keep yourself informed if you want to stay competitive.

Describe your typical day.

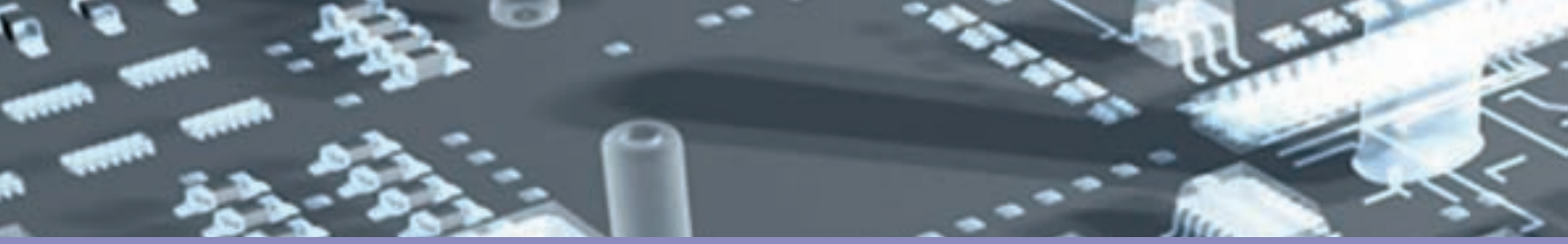
Usually, I work at least 10 hours a day, but my working hours are flexible. I can't really describe my typical day, as the work is very varied. A project usually starts with planning the experiment and ends when the results get published, and the time in between can sometimes be months. In the experimental phase, I spend a lot of my time in the laboratory. This is the most exciting part — full of ups and downs. Nature is full of surprises just waiting to be discovered, so you have to keep your eyes open for the unexpected. One learns to accept obstacles as a part of normal scientific life. After all, the moments when you discover something new are unforgettable.

The second important part of my work is data analysis, which includes a lot of work at the computer. Sometimes, serious theoretical modelling is needed to decipher the experimental data. To figure this out, I often perform literature searches. Thanks to computers and the modern online journal databases, this is a relatively easy process nowadays. It also helps to keep track with the recent discoveries relevant to the project. Scientific conferences provide excellent opportunities to present your work and stay informed about what other groups are doing. At the end, all this work is integrated in a manuscript, which means that I spend weeks writing. We usually celebrate publications with cakes or ice cream.

How did you get into science?

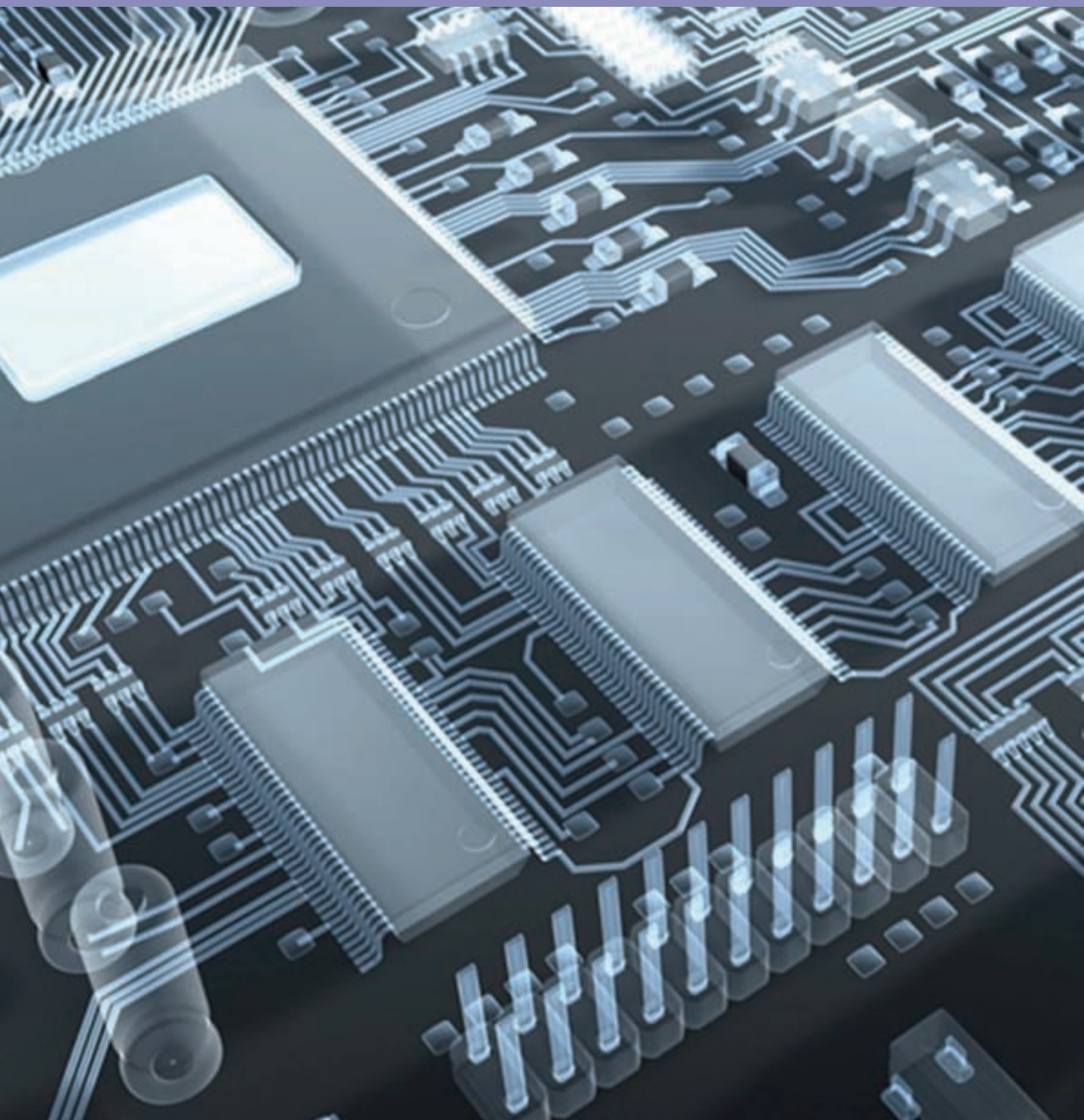
As far back as I can remember, I've enjoyed exploring the world around me. Never satisfied with leaving questions unanswered, I started experimenting early, but with a pretty low success rate! At the age of 10, my father gave me a book, *Sam Loyd's Logic Puzzles*, and I soon became addicted to numbers. My interest for mathematics and love of nature influenced me to become a physicist. After graduating from the University of Zagreb, I worked for 2 years as a scientific assistant at the University of Rijeka and then decided to leave Croatia to do a PhD abroad.

Doing a PhD definitely had a positive effect on me. Apart from learning a lot about the world around me, especially on the nano-scale, I've learned how to work in a team, to present my work effectively, to be patient, critical and well-organised. Such transferable skills make scientists very valuable on the job market.



Computational science is the investigation of natural phenomena using computers and experimental or simulated data, with the primary goal of understanding the underlying processes and eventually applying them to novel systems.

Computational Science



Hege Hansbakk Huuse

"Hi, I'm 29 years old and from Trondheim, Norway. For the last 3 years I have been working at CERN, one of the world's largest research centres for physics. We're trying to find out what the smallest building blocks of the universe are composed of."

Which subjects did you enjoy at school?

My interest in science and mathematics went up and down, but I ended up enjoying it and even finding it fun. Physics became one of my favourite subjects, even though I had a hard time understanding it. It is funny to think that I'm now actually working at CERN.

What profession to choose was a hard decision. I didn't make up my mind until the last year of school. Luckily, I had taken a good combination of subjects, which gave me plenty of scope to choose courses at university. Finally, I had to decide between studying to becoming a medical doctor or studying computer science, two pretty different fields. In the end, I chose the latter and got a Master of Science (MSc) degree in computer science. I've never regretted my choice because it led to many interesting job possibilities and flexible working hours.

What do you do?

My main task is to manage software licenses, which contain information about the legal aspects of using an application. Many of the applications used at CERN are commercial, which means a license is needed to use them. My job is to make sure that CERN staff have access to the applications and licenses they need for their work. I've also created a system that monitors the usage of applications at CERN. This helps me gather statistics on how many users we have for each application, and if we have enough licenses or not. My group can then save money by removing unused licenses, or invest in more licenses if the number of users of an application increases.

In addition to this, I create webpages. I am the so-called 'webmaster' of my group, which means I have to make sure people regularly update their pages, that the layout is easy to navigate and that the links work.

Because CERN is an international organisation based in Geneva, situated on the border between France and Switzerland, we have two official languages — French and English. However, a chaos of different languages is spoken in the corridors. In my department there are people from Belgium, England, France, Norway, Poland and Spain. When I get to work in the morning I hear many variants of 'hello' and 'good morning'.

What do you do in a typical day?

A typical working day for me starts at 8.30am and lasts until 5.30pm, including a 1 hour lunch break. I share an office with a nice Frenchman, which is great because I spend quite a lot of my time in the office. During the day I create software applications and web pages for the IT department. Sometimes I attend meetings about the projects I am working on, and sometimes I participate in conferences and courses in other countries. Of course I also have to report and present what I am doing to others. Additionally, I am responsible for making sure that the computers in our computer centre run as they are supposed to. The centre consists of two big rooms containing almost 3000 computers. Luckily, I am not responsible for all of them!

In my spare time I play handball, go hiking in the summer and skiing in the winter. Geneva is close to the Alps, which makes it easy for me and my friends to enjoy the mountains. Geneva is also centrally located in Europe so that we can easily travel around and visit new places.

Mirana Ramialison

"Hello, my name is Mirana! I have just finished my PhD in bioinformatics at EMBL. As an islander — I was born on Madagascar and grew up on Martinique — somehow it must have been my fate to work with fish. And my choice is Medaka, a small freshwater fish from yet another island — Japan."

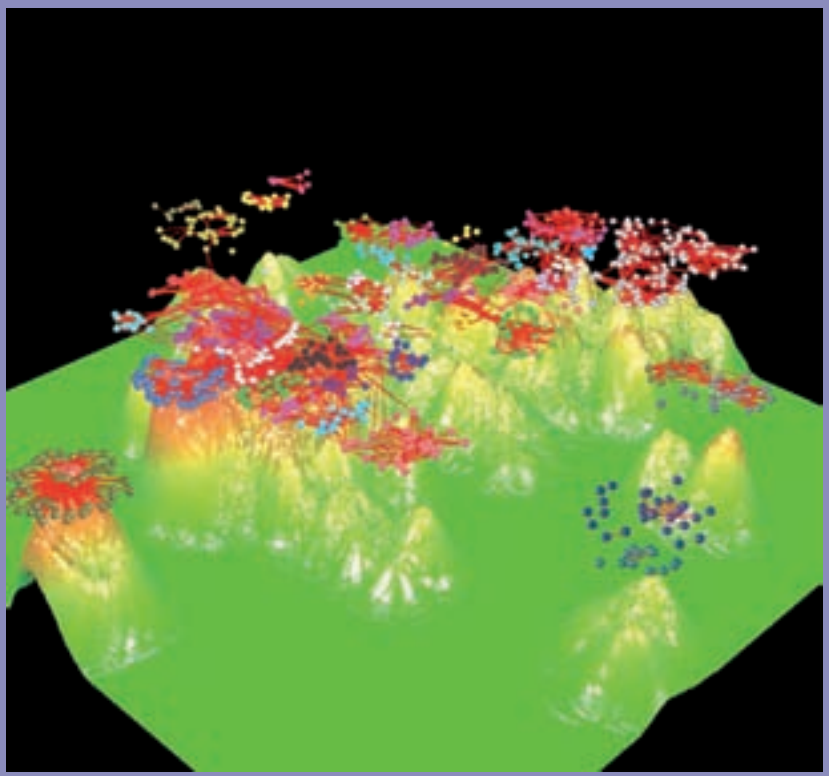
What's the best thing about your job?

What I like most about my work is the independence to follow your own ideas and to organise your research, and the opportunity to travel a lot. In research you have to go abroad to advertise your work and be aware of what scientists are doing in other labs around the world. During my PhD, I enjoyed attending conferences in Italy, the UK, the USA and Japan. But I have to admit that back in Germany, where the winters are not exactly warm, I'm always very happy to see my little Medaka again, which are happily swimming in aquariums where the water temperature is a tropical 25°C. When I'm not in the fishroom or at my computer, I practice Japanese and I also take German courses. I enjoy cooking different types of food (Malagasy and Creole, for instance), but most of all, I love dancing hip-hop, salsa and zouk, typical music from the French Caribbean.

What do you do?

In our research group, led by Professor Jochen Wittbrodt, we are studying Medaka ('the small fish with big eyes' in Japanese) to understand how eyes develop. Since Medaka and human eyes are similar, we can get a better understanding of human eye diseases resulting from malformations. When you look at transparent Medaka eggs under the microscope, you can actually see the eyes developing!

For my PhD work, I also tried to understand which genes are essential for the formation of other organs such as the brain or ears. I went to Kyoto to collect information on Medaka genes (there are more than 20,000) and built a database to store it. As it is impossible to study so many genes at once — it can take a whole career to study the function of just one — I have written computer programs to predict and analyse their function. I also do experiments to validate whether the predictions are correct or just complete nonsense (which is more often the case, I have to admit, and that's why a PhD always takes more than 3 years!).



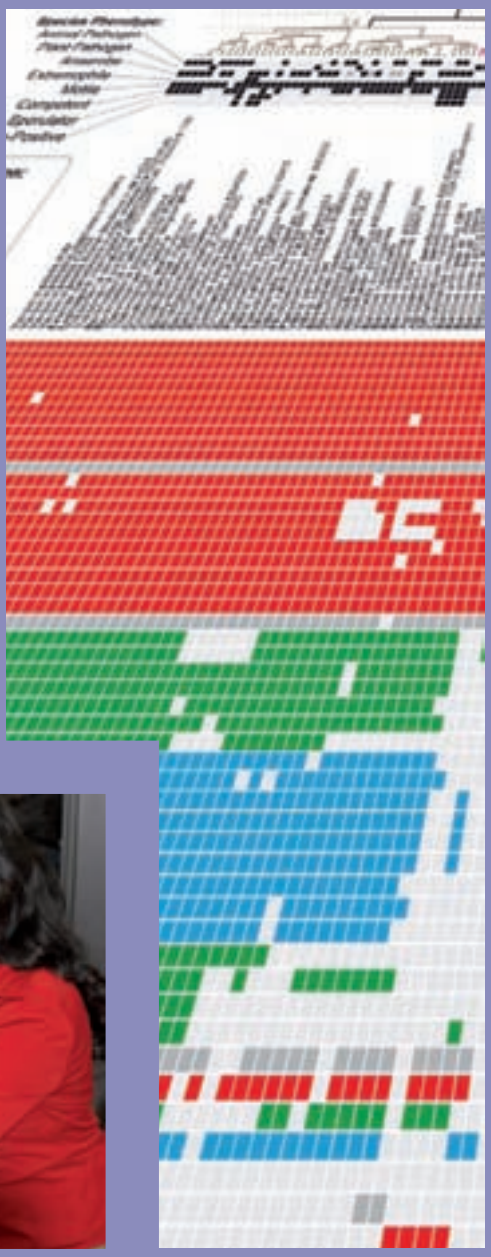
Which subjects did you enjoy at school?

I remember at primary school, I was so impatient to go to school on Saturday mornings, because that was the day we were allowed to play with computers! (No, I'm not a geek). During high school, I enjoyed both biology and mathematics a lot, so it was not easy to decide which field to follow.

I started to study biology at the University of Grenoble, and then graduated from an engineering school in biotechnologies in Marseille, where I learnt bioinformatics. This was by far my favourite subject, since it required computer science and knowledge of biology, so I didn't need to choose between them anymore!

Amoolya Singh

"I'm a computational biologist at the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany, which is a fancy way of saying I use computers to understand living things."



How did you get into science?

I was born and raised in India in a family of scientists and artists. I remember at the age of 5 going with my mother to her laboratory and asking what she did. She explained that she took very detailed pictures of the insides of living things, so I asked her if she could take a picture of the inside of me. My father was also a biologist. He used to take us on long walks, pointing out trees, flowers, birds and insects, and making up outlandish stories about their secret lives. Meanwhile, my mother's brother, a geologist, introduced me to the world of engineering, chemistry and maths.

Music has also been an important part of my life, and when finishing school, I couldn't decide whether to pursue a career in music or science. After a lot of agonising, I decided to continue music as a serious hobby on the side, and entered Carnegie Mellon University in Pittsburgh on a full scholarship to study biology.

How did your career progress?

I had no intention of studying computer science, since my primary interest was in biology. But the first year curriculum included a class in programming, a new subject for me. A 45-minute assignment would take me 6 hours — I was still teaching myself how to type! But instead of discouraging me, this only made me more determined to do well. I persevered, finishing the class with an A. I became fascinated that sequences of events could be represented by a program that was written out beforehand. Around the same time, I was learning genetics and developmental biology (how an embryo grows into an adult organism), and it seemed that there were many conceptual connections between computer science and biology.

I then went on to UC Berkeley, where I completed a PhD in computational biology on how bacteria respond to environmental stress and how this process has evolved over millenia. As part of my PhD, I spent a summer at the Pacific Northwest National Laboratory near the Hanford nuclear waste site. Scientists there were studying a uranium-eating bacterium and using computers to analyse its patterns of gene expression. It was very rewarding to put my work to practical use, and I returned to Berkeley at the end of that summer with a renewed sense of purpose and energy. At EMBL, I am continuing to study the evolution of bacterial stress responses, now examining bacteria in the wild ('metagenomes') rather than in the lab.

What's the best part of your job?

I love science because, like music, it allows me to be creative, to think on my feet, to be playful and retain a sense of childish wonder about the world. Through doing science I have also developed as a person: I have learned to accept and respond to criticism, to work with different kinds of people from all over the world, to work hard and have faith in myself, even when it's not clear if a project will succeed, and to take success with humility and failure with humour.

All the while, I have remained a dedicated student of music, and have finally stopped wondering if I made the right career choice.

Ambassador's diary

Name: Kathrin Goldammer, PhD student, physics
Location: Geschwister Scholl Gymnasium, Pulheim, Germany
Date: 11–12 October 2007

When I arrived at my old school, I was handed a list of five classes that I would be visiting that day, with students aged 13 to 17. In each class I introduced myself and explained how I moved from Pulheim to Berlin to study and work. I also showed a map of the world highlighting all the places that I had visited during my PhD – and that was a LOT of places – and talked about where I work now, a particle accelerator lab in Berlin called BESSY. I tried to give them an idea about accelerators in general. In some cases, this extended into a discussion of Dan Brown's popular novels, or led to an introduction on elementary particle physics and its relevance to science.

This was also the point when the students asked "what is this good for?". This gave me the opportunity to do some experiments. I had prepared one experiment involving a green laser pointer and a plain piece of fabric. If the laser beam is directed through the fabric, a diffraction image can be seen on the wall, from which a scientist can calculate the inner structure of the fabric. At BESSY, we use light in this way to probe all sorts of material including biological samples.

I also brought polarising foil which can be used to do two things: 1) it can be placed on the overhead projector and rotated over another piece of polarising foil to make a variable filter; 2) if a clear plastic object like a ruler is placed between the two sheets, tension lines in the material become visible.

Lastly, I brought a number of samples which were manufactured at BESSY. These include tiny cog wheels which can be used in little motors or gears. It wasn't easy conveying the idea of 'designing things on a small scale', but it's generally beneficial to make mechanical objects smaller; for example, hearing aids and pacemakers. Also, to everyone's comfort, computers have shrunk to the size of laptops, and a mobile phone now contains cameras and MP3 players.

Some of the students' recurring questions were: Why do you do this? What do you have to study if you want to work in this field? What's all that technical effort good for? Is it safe working so close to a source of radioactivity? In summary, visiting the Geschwister Scholl Gymnasium was a fun experience. I learned a lot about science communication and I hope that I made an impact on the students. My goal was not only to entertain them with physical phenomena, but also to let them know how much effort we put into our research and how many challenges we face every day.

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