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# Foreword

Over the last few years, the Faculty of Science has grown tremendously. The numbers of students and academic staff, the number of PhD degrees conferred and the level of funding for contract research have all reached new heights. In 2017, as growth slowed, we enjoyed a year of very welcome stability in our Faculty.

Of course as I look back on the year, I cannot help but recall two major disappointments. In the spring, the plans for joint accommodation with VU Amsterdam fell through and, towards the end of the year, the Netherlands Organisation for Scientific Research decided not to move the SRON Netherlands Institute for Space Research to Amsterdam Science Park. Particularly for those who worked tirelessly on these plans in recent years, this came as a massive blow. It implies that we need to rethink the way we collaborate with our partners.

But there are also countless reasons for optimism. I'm excited to see that interest in science is at a historic high, and that it draws so many students to the Faculty of Science. Even with the rise in student numbers in recent years, we have been able to maintain a high teaching standard. One of our largest programmes, the Bachelor's in Biomedical Sciences, received the exceptional rating of 'good' in its 2017 reaccreditation cycle; three other programmes were rated 'good' a year previously.

The quality of our research output is also world class. An impressive 73% of publications from Faculty of Science researchers appears in the top 25% of high-impact journals, which is three times the global average.

Our strength lies in staying close to fundamental research in all disciplines. This is paying off, as more and more companies are seeking out our expertise. One example is the DeltaLab for Deep Learning Technologies, a collaboration between the UvA and Bosch, that opened in 2017. The benefits are definitely mutual: the collaboration instantly created over ten PhD and postdoc positions, opening up unique opportunities for a future generation of top researchers.

It is these kinds of developments that make me look ahead with confidence. It gives me great pleasure to present many more highlights in this annual overview.



**Prof. Peter van Tienderen**  
*Dean of the Faculty of Science*  
*University of Amsterdam*





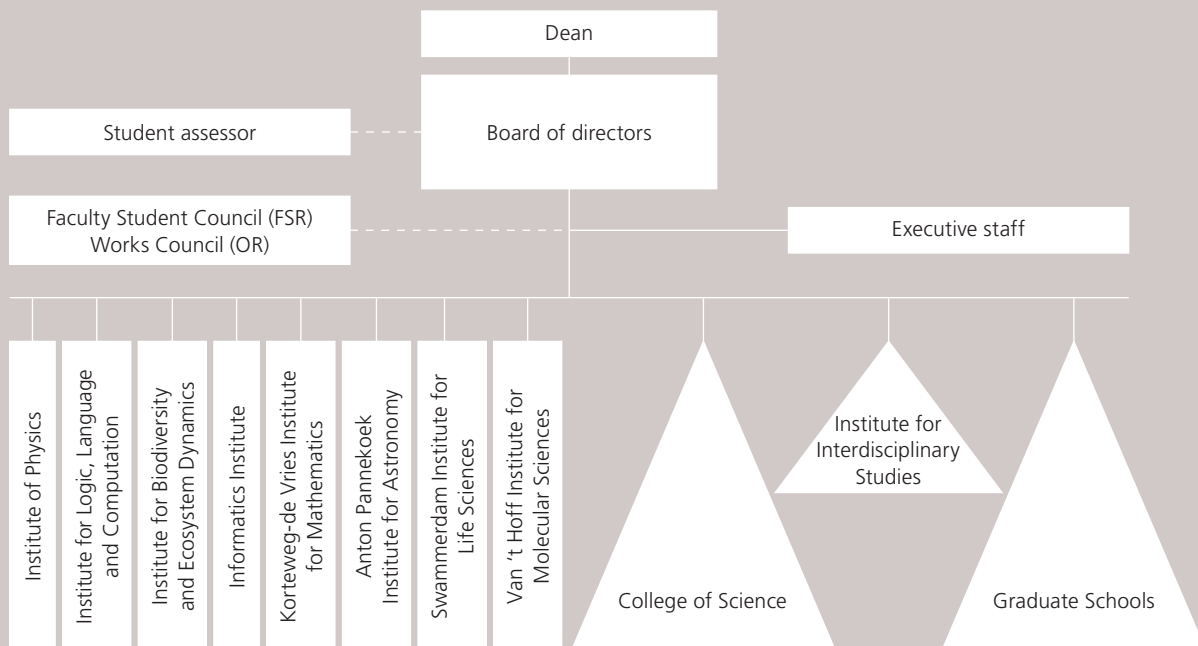


### The Faculty's board of directors

Left to right: **Rudi Rust** is director of finance, responsible for the planning and control, market development, ICT and project support portfolios.

**Mariska Enneking** is acting director of operations, responsible for HR, facilities, accommodation and occupational health, safety and environment portfolios.

**Peter van Tienderen** is dean and president of the Faculty's board of directors. He is portfolio holder for research, education and innovation. He is also responsible for PhD student policy.



# Innovation in teaching

Lecturers at the Faculty of Science are not only enthusiastic about transferring their knowledge and passion for research to students, they are also constantly challenging themselves to learn and innovate as teachers.

**Ilja Boor**, lecturer in the Bachelor's programme Psychobiology *Obtained her Advanced University Teaching Qualification (Advanced UTQ) in 2017 and is the recipient of two Grassroots projects for ICT innovation in teaching*



‘To help students direct their own learning process, I came up with the idea of developing ‘explanations’ (explanatory animation videos), which explain concepts and

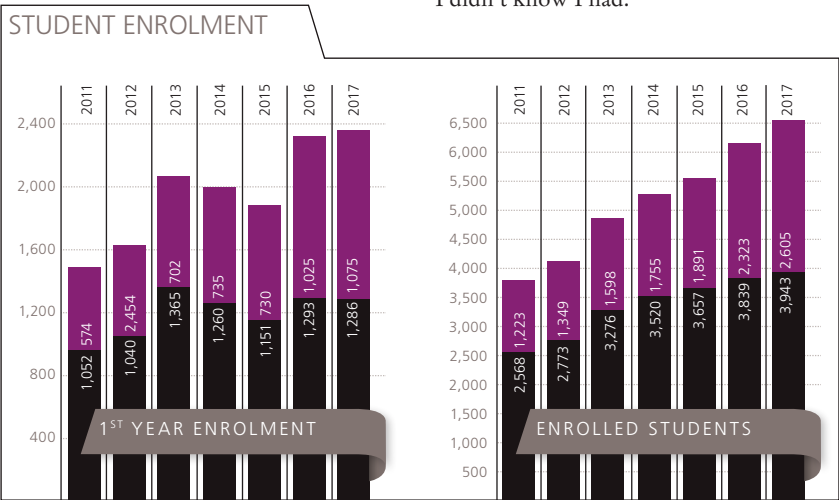
themes around self-directed learning to first-year students. We are developing the videos with a team of lecturers, writing the scripts and the storyboards ourselves. A positive side-effect I had not foreseen was how much *we* would learn. I just wanted to make something for the students, so it was really amazing to see how energising it is for myself and the other lecturers in the team. I am discovering and developing qualities I didn't know I had.’

**Annemieke Petrignani**, lecturer on ‘organic chemistry in space’ *Working on her UTQ and co-initiator of the interdisciplinary honours course ‘How to make an alien’ which started in 2017*



‘Chemistry in space is very different from that on Earth because in space there's a vacuum and everything is extremely cold. In my research I'm trying to find out what organic

molecules in space look like. These are the proto-building blocks of planets and stars, and eventually of life. Together with lecturers from other disciplines, we set up the honours course How to Make an Alien: Life on Other Planets. The course is about what alternative life could look like, by approaching it from biology, astronomy and chemistry. What I really enjoyed about this is how we learned from each other, as we didn't necessarily knew each others fields very well. After working together to streamline the course, we almost wanted to take it ourselves.’



**Rob Belleman**, programme director and lecturer in the Bachelor's programme Computer Science

*Obtained his Advanced UTQ in 2016*



'Presenting problems that are difficult to grasp in such a way that people finally 'get it', is at the heart of my work as computer

scientist. As programme director I encourage lecturers to take teaching courses or experiment with different teaching methods, or I help if someone wants to apply for a UvA Grassroots grant, which enables them to develop technology for use in their teaching. I myself am currently working on a project in which we are trying to use virtual reality to present 'difficult problems'. It might be that the problem is merely difficult to picture for students, but it could also be a problem that is too expensive or too dangerous to work on in reality. If we are successful, we will be able to visualise the different elements of which such problems are comprised and help students in their comprehension.'

The Faculty's seven study associations provide a warm welcome to new students. By students for students, they organise social and educational activities throughout the year. For many, they make their time at university unforgettable.

**NSA Physics, Astronomy and Mathematics / 1,050 members /** In a joint effort with staff and students NSA realised more cohesion on campus by organising staff-student drinks, info events on big faculty decisions and more joint events. On top of that, we went on excursion to ITER and organized a study trip to Dublin.

**ACD Chemistry / 414 members /** 2017 was a wonderful year for ACD, looking back on many interesting lectures and excursions, including the first study trip by plane in ACD history. Fifty ACD members went to Lisbon, where they enjoyed the local culture and visited several universities and chemical companies. Furthermore, the academic year was kicked-off with a Food-themed symposium with many great speakers.

**CONGO Biology, Biomedical Sciences and Psychobiology / ± 2,000 members /** Last year we organised a lot of great activities. One that stands out was our annual symposium. This year's theme was 'Breaking Balance', with various subjects ranging from unbalanced ecosystems to internal regulation in humans. This year there were not only national, but also international speakers. Just like previous years, the symposium was a great success!

**VIA Information sciences / ± 1,500 members /** 2017 was another great year for VIA. We had the honour of organising the Benelux Algorithm Programming Contest, which was a great success. We also embarked on a study trip to Valencia, and reached a milestone with our annual Awesome IT conference: we sold 300 tickets!

**Spectrum Natural and Social Sciences and Future Planet Studies / 888 members /** In the broad spectrum of highlights of Spectrum in 2017, the 'low barrier night' was definitely one of them. We had musicians transforming into cats, an appearance of fidget-spinner-masters and a top of the bill kazoo performance. All while sitting on couches, lost in the living room atmosphere created at Studio/K.

**GAOS Earth Sciences and Physical Geography / 120 members /** In 2017, GAOS organised a trip to Slovenia to hike through beautiful gorges and visit Ljubljana, one of the greenest cities in the EU. In November, we also celebrated our 25th anniversary with a week of events, including a symposium attended by many alumni.

**Cognito Brain and Cognitive Sciences / ± 150 members /** In 2017 Cognito organised the first edition of CognitoTalks in Pakhuis de Zwijger. Various engaging 'TED-style' talks covered a broad scope of topics about cognition. To stimulate our interdisciplinary scientific focus, speakers from fields in cognitive sciences and the brain came together to create an informative, inspiring, and interactive night.

# Faculty of Science Bachelor's programmes

In nine degree programmes spanning the entire science spectrum, the College of Science is responsible for the education of over 2,924 Bachelor's students. Another 1,019 students are enrolled in one of the two Bachelor's programmes offered by the Institute for Interdisciplinary Studies (IIS).



Students at work in the NS Station Lab

## Psychobiology students study waiting behaviour

In October, Psychobiology Bachelor's students explored how passengers travelling by train experience waiting. In the NS Station Lab passengers and visitors were able to take part in interactive experiments and tests that have to do with waiting – gaining self-insight and making a contribution to science at the same time.

## Success for the Dutch Nao Team

The Dutch Nao Team, a team of Bachelor's and Master's students in Artificial Intelligence, won the Open Challenge at the Iran Open 2017. With their Behaviour Engine, the students demonstrated how the robots can adjust their behaviour to observations on the football field.

## Huawei Seeds for the Future

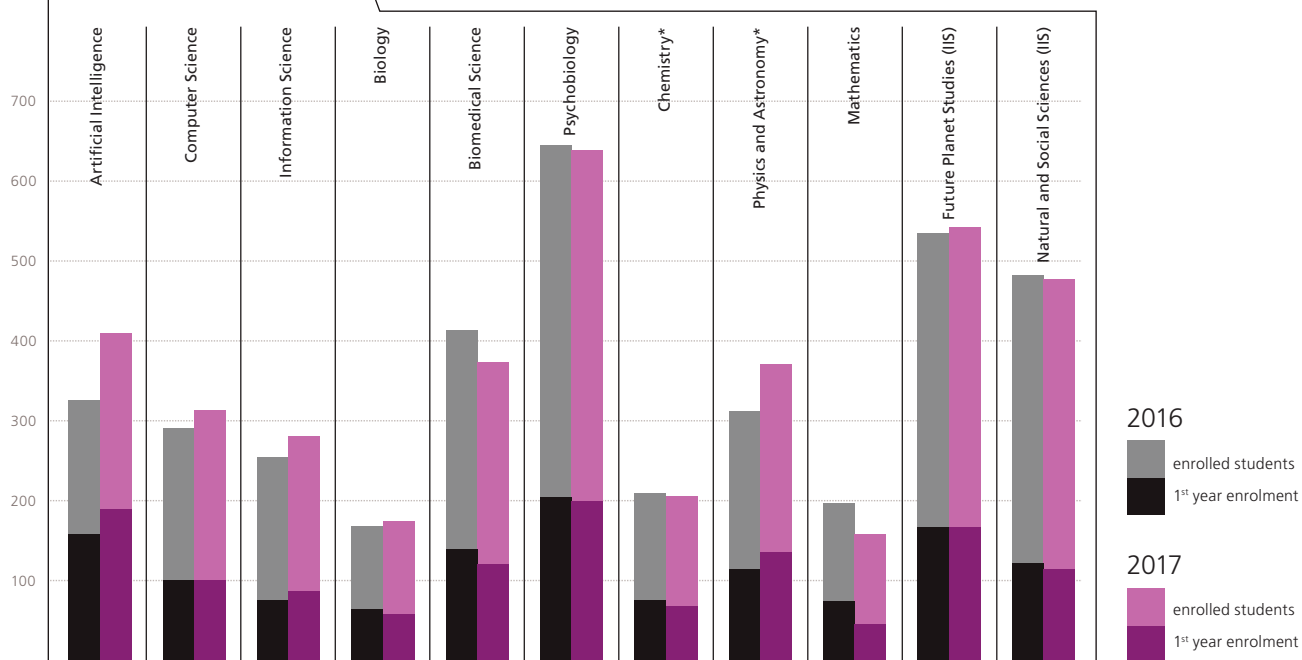
Michelle Appel, Lucas Fijen, Martijn Heijstek, Jelmer Neeven, Jasper van Haastere and Fenna van der Ploeg were selected for the Huawei Seeds for the Future programme, a summer internship which gives students the opportunity to strengthen their skills and working knowledge of the ICT sector. 'The combination of learning about the Chinese culture and being able to look inside such a big international IT-company was very exciting,' said student Lucas Fijen about the trip.

## Awards by Royal Dutch Society of Sciences

Four Bachelor's students received a Young Talent Encouragement award in the exact and technical sciences from the Royal Dutch Society of Sciences (KHMW). They are: Robin van den Berg (category: Physics and technical physics - joint degree with VU), Eveline Tiekink (category: Chemistry - joint degree with VU), Mick Gielen (category: Mathematics and technical mathematics) and Teun Mathijssen (category: Informatics and technical informatics). These students obtained the best results in their year and received a monetary award of €500.

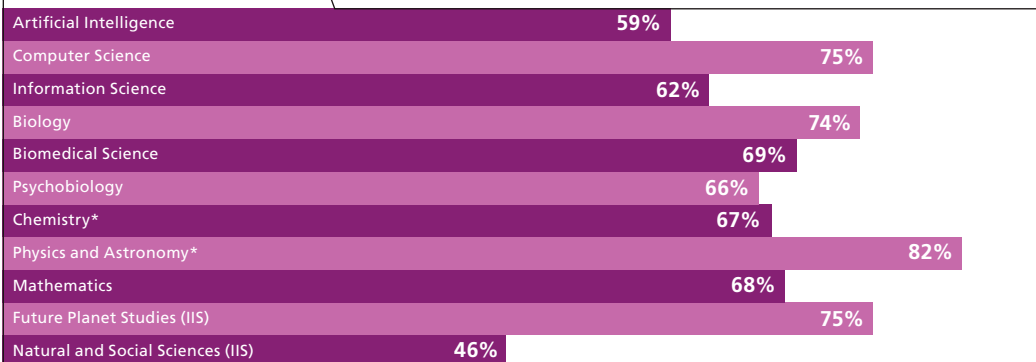


## STUDENT ENROLMENT



\*Joint programme with VU.

## GRADUATION RATES



\*Joint programme with VU.

Diploma after four years; degree programme commenced in 2013. Small cohorts may cause academic success rate to fluctuate.

# Faculty of Science Master's programmes

The Faculty of Science's 20 Master's programmes provide high quality, research-intensive education to approximately 2,391 students. In specialised tracks and minors, the education portfolio covers a wide range of students' interests. A further 215 students are enrolled in a Master's programme at the Institute for Interdisciplinary Studies (IIS).

## School of Data Science

On 24 March, the School of Data Science opened. This initiative by UvA, VU Amsterdam and AUAS offers over 200 Data Science related courses and programmes. The School aims to contribute to addressing the huge demand for Data Science talent worldwide. It is expected that this year alone, 8,000 data scientists are needed.

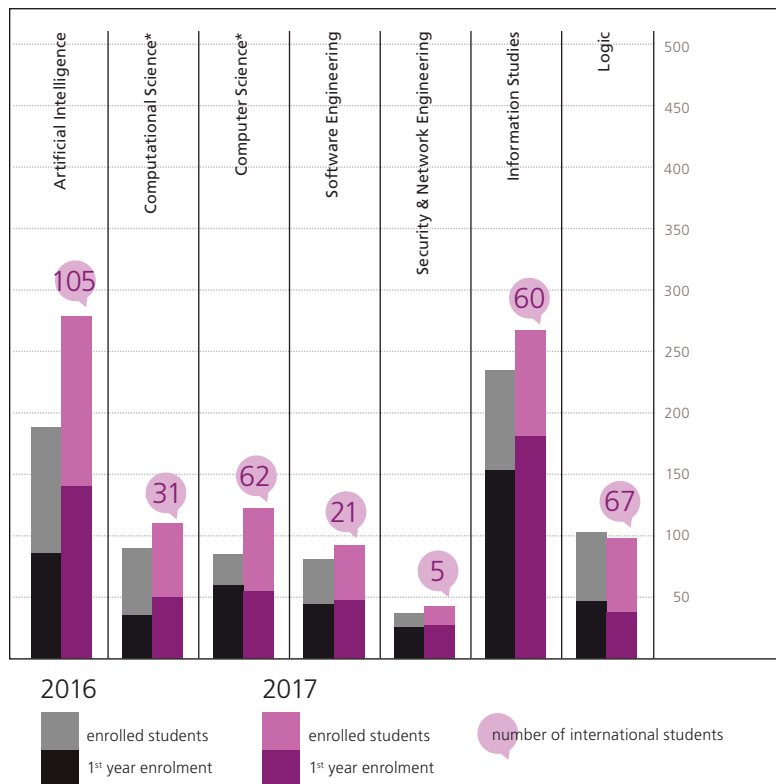
## New track in Earth Sciences Master's programme

In September 2017 the Master's programme Earth Sciences started a new track. The Future Planet Ecosystem Science (FPES) track equips students with quantitative methods and in-depth knowledge of geo-ecological systems, needed to face the grand challenges associated with global change.

## Prizes for Master's students

With his essay 'Sustainable Chemistry - A chance, not a burden', Master's student Eric Schuler won a two-month research trip to Chengdu, organised by Sustainable Chemistry (UvA-HIMS).

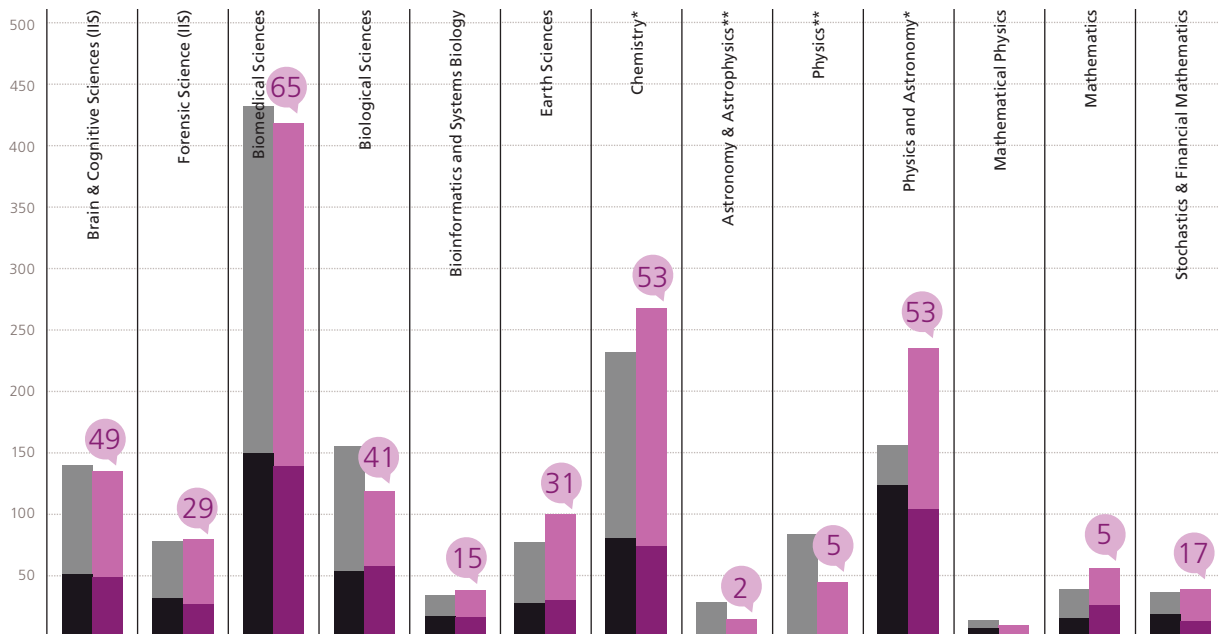
Graduate Laura Driessen (MSc Physics & Astronomy) received the De Zeeuw-Van Dishoeck Graduation Award for Astronomy for her thesis on a new supernova residue. The prize, amounting to €3,000, is awarded annually by the Royal Dutch Society of Sciences (KHMW).



Master's student Silke van Daalen won this year's UvA Thesis Prize. She won the award for her study of the analysis of demographic patterns in populations of human and non-human organisms. She received the prize, worth €3,000, at the annual UvA University Day. Supervisor Hal Caswell (UvA-IBED) praised Silke for producing an outstanding thesis on a challenging topic.



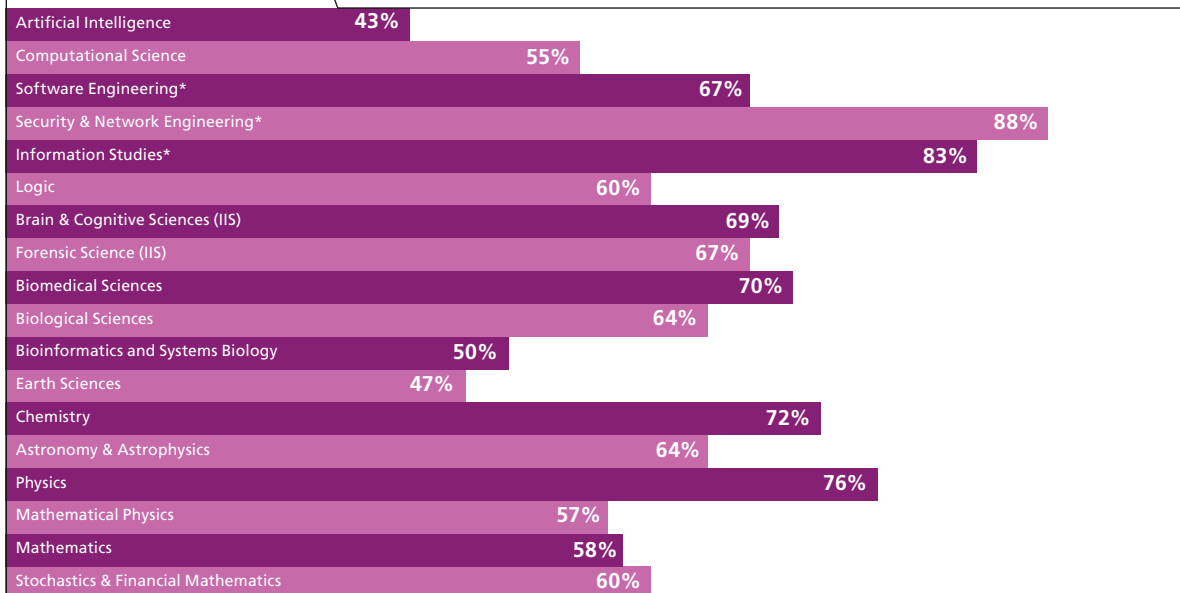
## STUDENT ENROLMENT



\*Joint degree UvA-VU, started in 2016

\*\*As of 2016 these programmes were merged into Physics and Astronomy

## GRADUATION RATES



Diploma after two (one-year Master's)\* or three years, degree programme commenced in 2016\* or 2015;  
small cohorts may cause the academic success rate to fluctuate.

# Institute for Interdisciplinary Studies



The Institute for Interdisciplinary Studies (IIS) is the University of Amsterdam’s centre of expertise for interdisciplinary learning and teaching. IIS works with faculties and external partners to develop and implement new educational methods.



FIGURES

IIS

Staff



FTEs

Teachers IIS	22
External teachers	4
Support and management	24
External support	5

Programme

2016-2017

Bachelor's	Future Planet Studies	966
Bachelor's	Natural and Social Sciences	502
Master's	Brain and Cognitive Sciences	141
Master's	Forensic Science	78
Electives	Minor / Honours / Public	1,657





As of March 2017, Henkjan Honing is the new academic director of the Institute for Interdisciplinary Studies (IIS). Honing is professor of Music Cognition at the University of Amsterdam.

### **An advocate for the interdisciplinary message**

'I believe very strongly in interdisciplinarity and how it can contribute to science and the world. I am therefore a proponent and advocate of the interdisciplinary message. A kind of ambassador. In this way, I hope to make a contribution to the sustainable, structural and stable anchoring of the IIS within the University of Amsterdam and the academic world.'

In spite of all the good work that has already been done, that still entails much explaining about what interdisciplinarity is and what it is not. All too often, even at 'higher levels', I hear comments such as: 'We have a statistician working here, so we're also engaged in interdisciplinarity.' However, interdisciplinarity is so much more than that. And moreover: it's something very different.'

### **Creating unusualness through interdisciplinarity**

'Each innovation begins with the unusual. And you create unusualness through interdisciplinarity, through enabling disciplines to merge with each other based around a theme. The disciplines themselves can help develop and are developed through interdisciplinarity.'

In a world where success is increasingly determined by adaptive ability, the ability to change rapidly and profoundly, interdisciplinarity has much to offer. What does this situation demand of me and in which way is this situation different than the previous one? Which tool do I need for that? Those are questions which interdisciplinarians feel very much at home dealing with.'

### **First National Interdisciplinary Education Conference**

During the first edition of this conference on 2 February 2017, Dutch and Belgian higher education institutions shared inspiring examples and case studies, and discussed the challenges that arise when implementing these new forms of education.

In 2018, the second edition will be held at TU Eindhoven. In 2019, the IIS organises an international interdisciplinary conference for the Association for Interdisciplinary Studies (AIS)

### **New elective: Placemaking**

IIS developed the new elective 'Placemaking: relay for city makers'. Twenty-four students from different Bachelor's programmes learn to apply their theory in this elective course in a broad network of scientists, residents, government and organisations and contribute to the area development of Amsterdam. Every semester a new group of students builds on the results of the previous student teams. This first year focussed on the area development of Science Park.

### **With Educators**

Education is always evolving and so are the people working in education. 'With Educators' invites teachers, education developers, tutors and trainers from the UvA to join the discussion and share their experiences. These regular meet-ups come in a variety of different formats such as workshops, pro-action cafes or other interactive sessions. With this new network the IIS aims to connect education professionals from different faculties.



Courage and perseverance are key to the development of interdisciplinary education.

Lucy Wenting, education director of IIS

# Innovation and impact at the Faculty of Science

Research at the Faculty of Science, often fundamental in nature, is boosted by collaboration with application-oriented partners. We are positioned at the beginning of the knowledge value chain: our research has the potential to lead to innovation and new products through further development in society or industry. Due to the available expertise and the independence of our researchers, companies are increasingly seeking to collaborate with us.



**Jitte Flapper**  
**R&D team leader at AkzoNobel**

‘Collaboration with UvA’s Van ’t Hoff Institute for Molecular Science (HIMS) is essential for us in our quest for the perfect paint. Developing the catalysts we need is a highly specialised task. We’ve engaged the chemists at UvA-HIMS because they’re experts at making new catalysts. They have excellent lab facilities and greater access to the latest developments and scientific insights.’



**Luuk Folkerts**  
**Environmental monitor**  
**at Gemini Offshore Wind Park**

‘The Theoretical and Computational Ecology group at the UvA’s Institute for Biodiversity and Ecosystem Dynamics (IBED) has a great store of in-house knowledge. For instance, they developed UvA-BiTS: small, lightweight transmitters that work on solar cells and monitor the coordinates and movements of birds with extreme precision. Thanks to our collaboration, we can learn how the movement patterns of the lesser black-backed gull changes and reacts to the turbines at our wind farm. But even if it turns out that the birds rarely or never visit the wind farm, we’ll still be gaining fundamental new knowledge on its behaviour.’



**Peter Rauber**  
**Senior director of engineering**  
**at Qualcomm**

‘Qualcomm joined forces with UvA in QUVA lab, a research centre in the relatively new field of deep vision. Here, we really have the best of both worlds: researchers get to interact with engineers and scientists in an industrial research environment and learn to work within the constraints of practical solutions. We hope that this type of collaboration will contribute to more people pursuing research and a career in machine learning. Being located at Science Park is ideal for engaging talented students at the Faculty of Science. For example, we offer internships where students can work on cutting-edge projects.’

# A broad spectrum of science research

The Faculty of Science is home to eight research institutes, covering a broad spectrum in the natural, exact and life sciences. Research institutes work together on leading multidisciplinary research themes and forge connections with partners in society and industry. Working in a project-oriented manner at the local, national and international levels enables development and reinforcement of specific areas of expertise.

FIGURES

## FACULTY OF SCIENCE

### Scientific staff



		FTEs
Total		1,033
Male		715
Female		318
Professors		88
Associate professors		79
Assistant professors		102
Postdocs		208
Lecturers and PhD candidates		553
International staff		498

### Doctorate conferrals

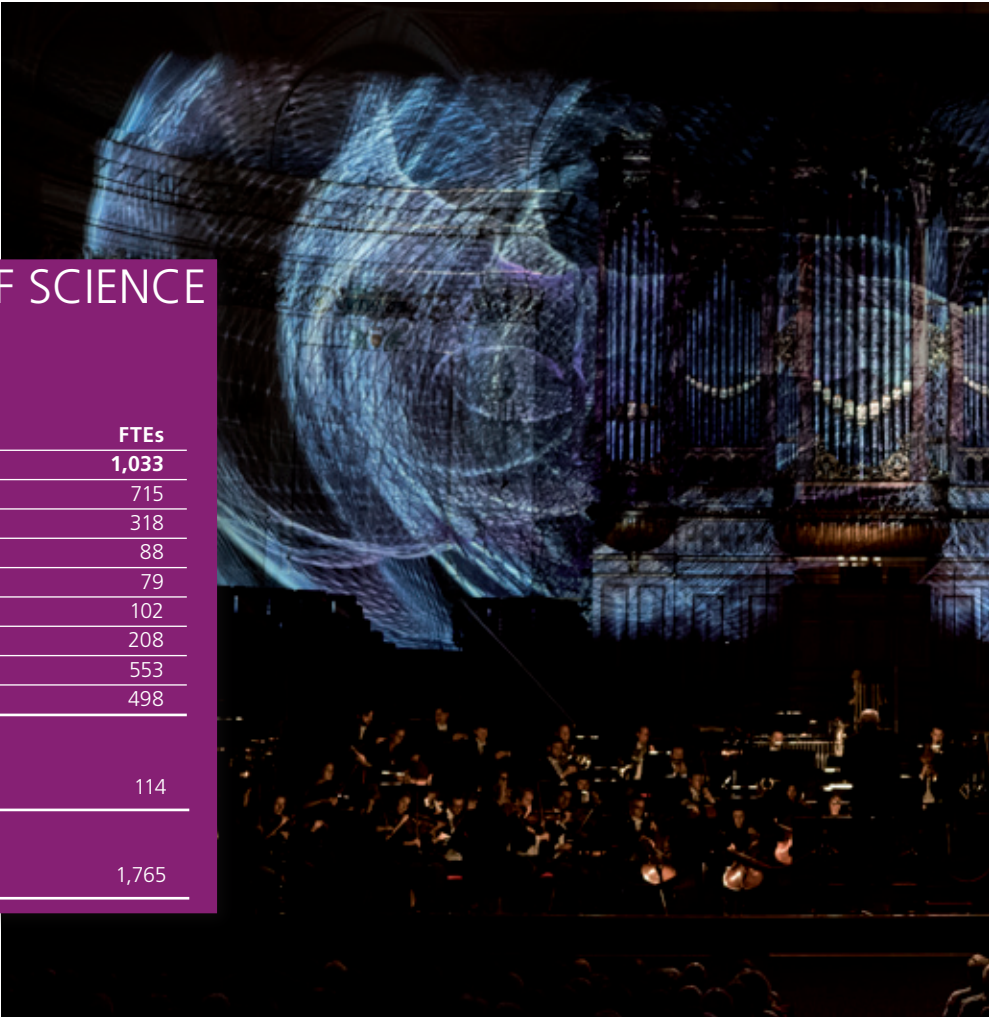


114

### Publications



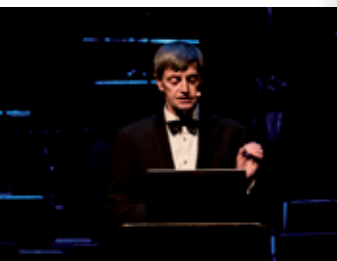
1,765





## Multiversum: the polyphonic cosmos

A unique collaboration between the Royal Concertgebouw Orchestra and the Faculty of Science resulted in a special concert on 19 October. For ages, scientists have seen connections between music and the ordering of the universe. At this event, conductor and composer Peter Eötvös presented his own composition *Multiversum to the world*, visualised with images from graphic designer Jaap Drupsteen. Prior to the concert, Vincent Icke, professor of Cosmology by special appointment at the UvA, gave a lecture on parallel universes. The Anton Pannekoek Institute for Astronomy hosted several outreach activities during the break and surrounding the event.



## NWO grants

- The Netherlands Organisation for Scientific Research (NWO) awarded Veni grants to three researchers at the Faculty of Science. The grant, amounting to €250,000 for each project, gives promising young researchers the chance to further develop their ideas over a period of three years. Laureates are: Alexandre Belin (IoP), Like Fokkens (SILS) and Michael Walter (IoP, KdVI and ILLC).
- Prof. Daniel Baumann (IoP), Dr Edan Lerner (IoP) and Dr Selma de Mink (API) each received an €800,000 Vidi grant from NWO to develop their own innovative line of research and set up a dedicated research group.
- Dr Jaap de Roode (IBED and Emory University) was awarded the prestigious NWO Vici grant.
- Jesús Aguirre Gutiérrez (IBED) received a Rubicon Grant from NWO to conduct research at the University of Oxford. The Rubicon programme gives young, highly promising scientists the opportunity to gain international research experience.

## ERC Advanced Grant for Jean-Sébastien Caux

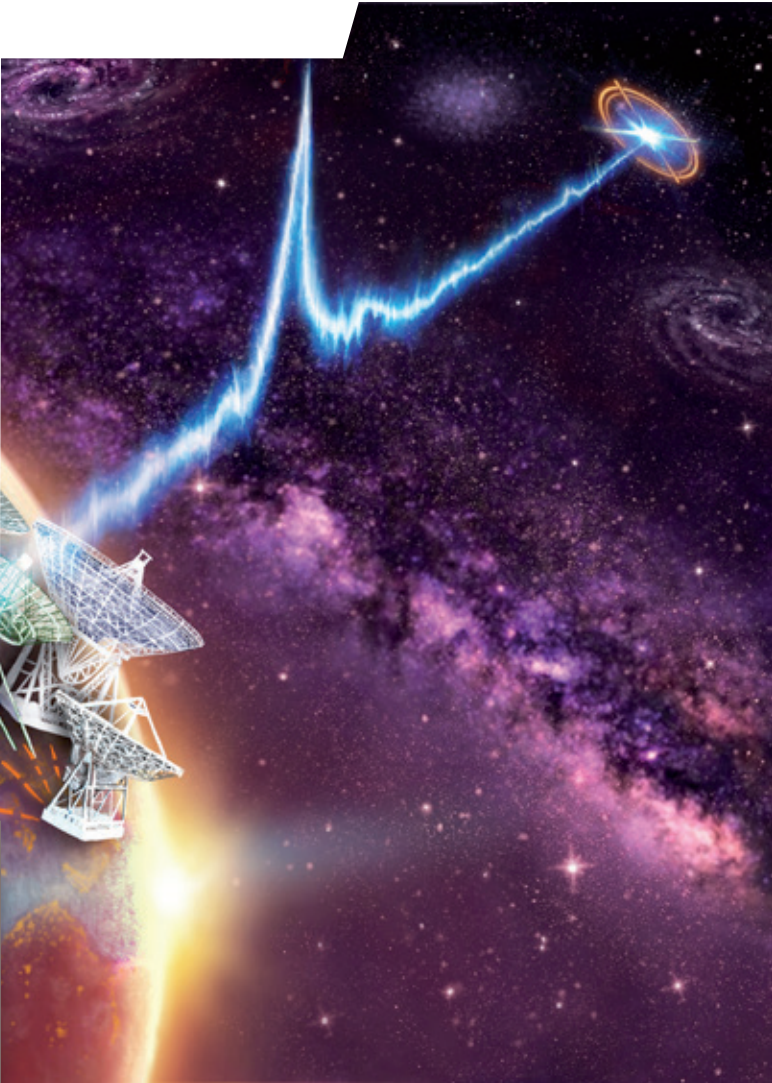
Prof. Jean-Sébastien Caux (IoP) received an ERC Advanced Grant for the amount of €2.5 million. The grant is awarded for the scientific excellence of both researcher and research proposal. Caux's project is titled 'DYNAMINT: Dynamics of Probed, Pulsed, Quenched and Driven Integrable Quantum Systems'.

## Marie Curie Fellowships

Six promising researchers were awarded a Marie Curie Fellowship to conduct their research at the Faculty of Science. Gaurav Dugar joined SILS, Laura Gangoso joined IBED, Melissa McClure joined API, Gui Leite Pimentel and Neil Robinson joined IoP, and Carlo Proietti joined ILLC. They were each awarded €180,000 as part of the European Commission's Horizon 2020 programme.




# Anton Pannekoek Institute for Astronomy

Researchers at the Anton Pannekoek Institute for Astronomy (API) seek to understand the universe, the objects in it and their history. They test the laws of nature and find new laws.



FIGURES

API

Staff		FTEs
Full professors		5
Associate professors		7
Assistant professors		3
Postdocs		25
PhD candidates		44
Support and management staff		8
Doctorate conferrals		5
Publications		288

The globally distributed dishes of the European VLBI Network and the 305-m William E. Gordon Telescope at the Arecibo Observatory in Puerto Rico. Using the combined data of this network, a team of astronomers including API's Dr Jason Hessels have localised the exact position of the Fast Radio Burst FRB121102 within its host galaxy. The research was published in three separate articles in Nature and Astrophysical Journal Letters. Credit: Danielle Futselaar ([www.artsource.nl](http://www.artsource.nl))

### Explanations for 'chameleon supernova'

An international team of astronomers, including Manos Zapartas and Dr Selma de Mink, has found two possible explanations for the behaviour of chameleon supernova SN 2014C. Either the star threw off its hydrogen-rich material late in life (in a sort of last breath), or the star was stripped by an accompanying star.

### Neutron star with strong magnetic field may still launch jets

An international team of astronomers including PhD student Jakob van den Eijnden, Dr Nathalie Degenaar and Prof. Rudy Wijnands suspects that neutron stars with a strong magnetic field can still launch jets. Their findings were published in two articles in the Monthly Notices of the Royal Astronomical Society, with Van den Eijnden as lead author.

### No close partner for young, massive stars in the Omega Nebula

A team of astronomers including Maria Claudia Ramirez-Tannus, Prof. Lex Kaper, Prof. Alex de Koter and API alumni Prof. Hugues Sana and Dr Frank Tramper have discovered that, contrary to expectations, none of the massive stars in the star-forming region M17 in the Omega Nebula is part of a close binary star.

### The formation of seven exoplanets around Trappist-1

Dr Chris Ormel, Dr Beibei Liu and PhD student Djoeka Schoonenberg have offered an explanation for the formation of the Trappist-1 planetary system. The system has seven planets, each as big as Earth, that orbit close to their star.

### Rapidly-spinning black holes launch tilting jets

Thanks to a revolutionary fast method of calculation, Master's students Matthew Liska and Casper Hesp, Dr Adam Ingram, Prof. Michiel van der Klis and Prof. Sera Markoff demonstrated that it is possible for certain jet streams to gradually change direction (tilt) as a result of space-time being dragged into the rotation of the black hole.

### The launch of Multi-Messenger Astronomy

Using a vast system of telescopes, astronomers from all over the globe (including API's Prof. Ralph Wijers, Prof. Lex Kaper and Dr Antonia Rowlinson) were for the first time able to gather observational data on electromagnetic radiation from a source of gravitational waves (published in Nature).



In 2017, we saw the dawn of the multi-messenger era of astronomy.

Prof. Ralph Wijers, director of API

### Science news

- API has joined the Joint Institute for Nuclear Astrophysics - Center for the Evolution of the Elements (JINA-CEE, USA) as an Associated Institution.
- An international committee of experts evaluated the Netherlands Research School for Astronomy (NOVA) and Dutch astronomy institutions including API. They conclude that the research conducted at these institutes is world leading.

### Grants and prizes

- Dr Selma de Mink received a Vidi grant, the Beller Lectureship from the American Physical Society (APS), and the 2017 MERAC Prize for Best Early Career Researcher in the field of theoretical astrophysics.
- Dr Melissa McClure was awarded a Marie Skłodowska-Curie Individual Fellowship to conduct her research on star and planet formation at API.
- NWO bestowed a funding of €2.5 million euros upon the interdisciplinary research proposal 'Origin of Life'. The research will in part be carried out by researchers at API.

### Appointments

- Dr Sera Markoff: professor of Theoretical High-Energy Astrophysics, with a focus on relativistic compact objects and astroparticle physics.
- Dr Rudy Wijnands: professor of Observational High-Energy Astrophysics, in particular Relativistic Compact Objects.
- Prof. Michiel Hogerheijde was named professor by special appointment of Instrumental Astronomy. His research focuses on the formation of planetary systems.



# Van 't Hoff Institute for Molecular Sciences

The Van 't Hoff Institute for Molecular Sciences (HIMS) performs internationally renowned chemistry research, curiosity driven as well as application driven, within four recognisable themes Computational-, Analytical- and Sustainable Chemistry and Molecular Photonics.



## FIGURES

## HIMS

### Staff



### FTEs

Full professors	14
Associate professors	10
Assistant professors	9
Postdocs	27
PhD candidates	72
Support and management staff	26

### Doctorate conferrals



16

### Publications



268

Research at HIMS contributes to a solid foundation for the conservation of valuable works of art. For example, in oil paintings incredibly complicated chemical processes take place, continuing for centuries. While fatty acids in the oil form a polymer network, metal ions react with the oil on the surface of grains of pigment. The resulting 'metal soaps' pose a common problem in the conservation of oil paintings such as Johannes Vermeer's *Gezicht op Delft* (1660-1661, oil on canvas, Mauritshuis, The Hague).

Detail: Metal soaps.



## Aquatolide synthesis

A sample of the natural compound aquatolide, synthesized at HIMS, played a pivotal role in American research published in *Science*. In 1989 the structure of this natural compound, found in the *Asteriscus aquaticus* plant, was established by NMR analysis, although erroneously. It took researchers more than 20 years to discover this mistake. Not until 2017 the correct aquatolide structure could be confirmed, thanks to a HIMS sample. The 16-step synthesis route was developed in a purely curiosity driven project.

## Photoluminescent nanorods

A new method for very precise real-time determination of fluid flow in capillary networks was published in *Nature Nanotechnology* in collaboration with Paris-Saclay University. The study of fluid flow in capillary networks is relevant to many fields, as for example the determination of blood circulation in arteries. Although hydrodynamic simulations can yield important information, experimental studies as performed at HIMS are needed for ultimate confirmation.

## Temperature- and light-responsive switch

Metal Organic Frameworks (MOFs) are highly structured porous molecular architectures. This emerging class of inexpensive materials has great potential for energy efficient separation of gas mixtures. Together with Chinese colleagues it was discovered that diarylethene incorporated in a MOF provides temperature- and light-responsive switching properties to the separation of acetylene/ethylene mixtures, which is industrially very relevant.

## Valorisation

### ■ Bio-Based Live Europe

HIMS welcomed over 200 experts, entrepreneurs and innovators to this international conference for decision makers in bio-based industries.

### ■ Pilot plant

A multinational company built a pilot for removing cyanide from the waste water of steel mills based upon a HIMS patent.

### ■ Partnerships

A total of nine new projects were started, (co-)financed by companies (AkzoNobel, Avantium, BASF, Brite Solar, Da Vinci, Gensoric, KWR, PWN, Shell, Skytree) and other parties (UMC's, Van Gogh museum, RCE).

## Grants and prizes

- Prof. Fred Brouwer received the Honda-Fujishima Lectureship Award of the Japanese Photochemistry Association.
- Prof.em. Sjoerd van der Wal was awarded the second ever 'SCM Lifetime Achievement Award'.
- Dr Moniek Tromp received the NWO Athena Award.
- A total of 14 new projects (M€2,7) with HIMS applicants were granted.

## People

- Dr Joen Hermans received his PhD cum laude.
- Prof. Joost Reek was appointed as distinguished research professor at the Faculty of Science.
- Prof. Wybren Jan Buma became professor by special appointment of Spectroscopy of Photoactive Molecules and Materials at Radboud University Nijmegen.
- Prof. Gadi Rothenberg was appointed Senior Visiting Scholar at Fudan University in Shanghai.






In some ways, HIMS scientists are as diverse as molecules. And many different molecules together may form something beautiful.

Prof. Peter Schoenmakers, director of HIMS

# Institute for Biodiversity and Ecosystem Dynamics

IBED aims to increase our understanding of the diversity and dynamics of ecosystems, from the molecular and genetic level to entire ecosystems. How do organisms interact with each other and with their non-biological environment?



FIGURES		IBED
Staff		FTEs
	Full professors	8
	Associate professors	12
	Assistant professors	18
	Postdocs	26
	PhD candidates	52
	Support and management staff	26
Doctorate conferrals		8
Publications		266

### Fruit eating increases biodiversity

By dispersing the seeds of plants, fruit-eating animals contribute to the possibility of increased plant speciation and thus biodiversity. These are the findings of a new study led by Dr Renske E. Onstein and Dr W. Daniel Kissling. The results were published in *Nature Ecology & Evolution*.

### Soil fungi play important role in nature restoration

Together with a team of European biologists, Dr Elly Morriën discovered that relationships between soil organisms are missing during the first stages of nature restoration in former agricultural soils. Soil fungi play an important role in establishing these relationships. The results were published in *Nature Communications*.

### Hibernating mites show their true colors

A team of researchers led by Dr Thomas van Leeuwen revealed that the two-spotted spider mite uses a group of genes from fungi in order to produce particular pigments it needs for hibernation. The results were published in the *Proceedings of the National Academy of Sciences (PNAS)* and are important for understanding how this crop pest thrives.

### Microbes dictate regime shifts causing anoxia in lakes and seas

Gradual environmental changes due to eutrophication and global warming can cause a rapid depletion of oxygen levels in lakes and coastal waters. A team of aquatic ecologists led by Prof. Jef Huisman and Prof. Gerard Muyzer show that microorganisms play a key role in these disastrous regime shifts. The findings were published in *Nature Communications*.

### Science news

- IBED is involved in the interdisciplinary 'Origins of Life' programme that addresses questions from the Dutch National Science Agenda.
- R.V. Dreissena, a new research vessel for fieldwork programmes, was financed via crowdfunding.
- IBED signed a collaboration agreement with the municipality of Amsterdam and Amsterdam Green Campus for a green and sustainable development of Amsterdam.
- A number of IBED researchers and students joined the national multi-disciplinary expedition Netherlands Initiative Changing Oceans (NICO).

### Grants

- Dr Daniel Kissling obtained an eScience grant.
- Dr Laura Gangoso was awarded a Marie Skłodowska-Curie Individual Fellowship.
- Dr Jaap de Roode was awarded a Vici grant.
- Dr Masha van der Sande was awarded an NWO Rubicon grant.
- Martijn Bart, Ineke Knot, Rob Kroes, Gea van der Lee and Dr Benjamin Mueller received a grant from the KNAW Ecology Fund.
- Xing Ji received the 2016 Chinese Government Award for outstanding self-financed students abroad.

### Prizes

- Student presentation prize for Rína Magnússon.
- UvA thesis prize for Silke van Daalen.
- Review award for Dr Steven Droge.

### Appointments

- Prof. Astrid Groot was appointed professor of Population and Evolutionary Biology.



Natural selection is the only workable explanation for the beautiful illusion of 'design' that pervades every living organism.

J. Maynard Smith 1920-2004




Prof. Peter de Ruiter, director of IBED

# Institute for Logic, Language and Computation



ILLC professor Rens Bod receives the Chinese translation of his book ‘A New History of the Humanities’.

ILLC studies the processes involved in the encoding, transmission and comprehension of information. The concept of ‘information’ is given a broad interpretation, encompassing not only the characteristics of formal languages and information flows in natural language processing, but also human cognitive activities such as reasoning and listening to music.

FIGURES		ILLC	
Staff		ILLC total	of which Faculty of Science
	FTEs		
	Full professors	8	5
	Associate professors	7	6
	Assistant professors	11	6
	Postdocs	25	14
Doctorate conferrals		8	6
Publications		220	123



### Faculty professorate for Harry Buhrman

Prof. Harry Buhrman (professor of algorithms, complexity theory and quantum computing) was appointed 'distinguished research professor' at the Faculty of Science. Buhrman, whose main appointment is at CWI, was also awarded an €18.8 million NWO Gravitation Grant to establish a Quantum Software Consortium (QSC) for large-scale research on quantum software. QSC unites researchers in computer science, mathematics and physics from QuSoft, CWI, Leiden, QuTech, TUDelft, UvA and VU Amsterdam to carry out state-of-the-art research in this new field.

### Jin Yuelin Chair of Logic

ILLC professors Johan van Benthem and Martin Stokhof were appointed to the Jin Yuelin Chair of Logic at Tsinghua University, Beijing. Installed by Tsinghua in 2017, the Jun Yuelin chair will be held by a team of visiting professors whose aim is to support activities at the Joint Research Center in Logic (UvA-Tsinghua). Jin Yuelin was the founding father of modern logic in China as well as a pioneer in establishing bridges between China and the West in the field of philosophy. After receiving his doctorate at Columbia University in 1920, he returned to Beijing to lecture on mathematical logic and then went on to create the department of philosophy at Tsinghua University.

Logic, language and computation  
- together they form the engine  
which drives all our interdisciplinary  
investigations.

Prof. Sonja Smets, director of ILLC

### Grants and prizes

- ILLC PhD's Mostafa Dehghani, Faculty of Humanities and Iris van de Pol, Faculty of Science both received UvA385 Lustrum Grants. These grants offer a new generation of researchers the opportunity to gain international experience.
- Dr Luca Incurvati, Faculty of Humanities received an ERC Starting Grant for his project *From the Expression of Disagreement to New Foundations for Expressivist Semantics*.
- EU Marie Curie fellowships were granted to Carlo Priozetti, Thomas Schindler and Margot Strohming, Faculty of Humanities.
- Yfke Dulek was awarded the Ngi-NGN *Informatie Scriptieprijs voor Informatica en Informaticakunde* for her Master of Logic thesis. Yfke is currently a PhD candidate at CWI and ILLC.

### Books

- The Joint Research Center in Logic (UvA-Tsinghua) is host to a new Springer book series *Logic in Asia* and to the series *Short Textbooks in Logic* (both co-edited by Prof. Fenrong Liu).
- A Chinese edition of Prof. Rens Bod's book *A New History of the Humanities* was launched in 2017.

### Events

- ILLC organised an inspiring 4-day *Master Class in Logic* for secondary school students.
- ILLC co-organised the 12<sup>th</sup> *International Conference on Logic, Language and Computation* in Tbilisi, Georgia. This conference series was set up together with ILLC in the '70's, and ILLC members continue this tradition.
- ILLC has been organising the bi-annual *Amsterdam Colloquium* since 1976; the 21<sup>st</sup> edition held in 2017 was a great success.

# Institute of Physics






The Institute of Physics covers a broad spectrum of both experimental and theoretical physics. Topics range from string theory, particle physics and astrophysics to hard and soft condensed matter and quantum computing.



## FIGURES

IoP

Staff		FTEs
	Full professors	22
	Associate professors	16
	Assistant professors	12
	Postdocs	41
	PhD candidates	81
	Support and management staff	10
Doctorate conferrals		28
Publications		361

### XENON1T starts search for dark matter

Despite an earthquake near the experiment in January, XENON1T, the most sensitive dark matter detector in the world, had its first 30-day run in 2017. Prof. Patrick Decowski and Prof. Auke-Pieter Colijn played an important role in the international collaboration, and several of their team members were involved in analysing the first data. The project has already led to the strictest limits on dark matter interactions in the world, and will keep looking for those interactions in years to come.

### ERC Advanced Grant for Jean-Sébastien Caux

The European Research Council awarded an ERC Advanced Grant of €2.5 million to theoretical physicist Prof. Jean-Sébastien Caux. The Advanced Grant is awarded for the scientific excellence of both researcher and research proposal. Caux will use the grant for research on the dynamics of perturbed exactly solvable quantum systems.

### Marcel Vonk writes popular science book on black holes

The popular science book *Black Holes – Captured in Space and Time* by Dr Marcel Vonk was published by Amsterdam University Press in November 2017.

### NWO grant for Joint Solar Programme III

NWO has made a €2 million grant available for a strategic programme in the field of solar cell technology, the Joint Solar Programme III. The aim of the programme, in which the group of Prof. Tom Gregorkiewicz is involved, is to develop fundamental knowledge of hybrid tandem solar cells with a conversion efficiency of 30% or more.

### Grants and prizes

- Prof. Daniel Baumann and Dr Edan Lerner received NWO Vidi grants.
- A Gravitation grant for the study of quantum software was awarded to a national consortium including QuSoft at IoP.
- Marie Skłodowska-Curie Individual Fellowships were awarded to Dr Gui Leite Pimentel and Dr Neil Robinson.
- Dr Shin'ichiro Ando received a Japanese Grant-in-Aid for Young Scientists.
- NWO awarded a 'Projectruimte' grant to Dr Anne de Visser.
- Dr Alexandre Belin and Dr Michael Walter received NWO Veni grants.

### Appointments

- Dr Krassimir Velikov was named professor by Special Appointment in Physics of Soft Matter at the Faculty of Science.
- Prof. Paul de Jong was appointed director of the Institute of Physics, succeeding Prof. Daniel Bonn.
- Dr Els Koffeman was appointed professor of Instrumentation in Particle Physics at the Faculty of Science.
- Dr Auke-Pieter Colijn, associate professor at IoP, was appointed professor by special appointment of Experimental Particle Physics at Utrecht University.



The year 2017 brought us the disappointing decision not to proceed with the relocation of the VU Amsterdam Physics department to Science Park. Nevertheless, we remain committed to a close collaboration and we will define its future shape in 2018.

prof. Paul de Jong, director of IoP



# Informatics Institute

The Informatics Institute (IVI) conducts fundamental and applied research in the areas of information, complexity, and system engineering.



## FIGURES

IVI

### Staff



### FTEs

Full professors	9
Associate professors	9
Assistant professors	14
Postdocs	34
PhD candidates	74
Support and management staff	21

### Doctorate conferrals



21

### Publications



273

### New partnership with the police

A structural cooperation with the police has been established for the analysis of huge amounts of data seized in criminal investigations, such as photos, written content and videos. Two new IVI doctoral candidates will be employed by the National Police and one will be working for the Amsterdam Police.

### Launch of National Big Data Infrastructure initiative

Prof. Cees de Laat is one of the initiators to set up a National Big Data Infrastructure. In order to unlock the value of distributed datasets, an infrastructure is required for secure data sharing and high performance computing. Together with TNO and SURFsara, other partners are invited to join this initiative.

### Three million dollar funding for Cees Snoek

The US government awarded Prof. Cees Snoek with \$3 million for the development of artificial intelligence that can recognise, find and understand activities and objects in video images with high precision and speed.

### New funding for computer science research

Professors Theo Gevers, Cees Snoek and Max Welling, together with computer scientists from VU Amsterdam and eScience Center, received NWO 'Perspectief' funding for the Efficient Deep Learning programme. Dr Alfons Hoekstra received a Horizon 2020 Health Grant of €550,000 as partner in the INSIST project: IN Silico trials for treatment of acute Ischemic STroke.

EU funding was obtained for the SCORE project of Prof. Marcel Worring, to work on several challenging data-driven problems in Amsterdam, and for PROCESS: PROviding Computing solutions for ExaScale challengeS, a project of Dr Adam Belloum and Prof. Rob Nieuwpoort.

### Valorisation & collaboration

- The Machine Learning Lab led by Prof. Max Welling started a partnership with the Microsoft Research Lab in Cambridge.
- Dr Maarten Marx built a search engine for online news forum *De Correspondent*. It searches through motions, amendments and laws passed in the Dutch parliament since 1995.

### Grants, prizes, etc.

- Prof. Evangelos Kanoulas received the *Microsoft Azure for Research Award* and a *Google Faculty Research Award* for his project 'Session-based Personalization: Models and Algorithms'.
- Prof. Maarten de Rijke received the prestigious *Tony Kent Strix award*, a *Criteo Faculty Research Award* and a *Bloomberg Data Science Research Grant*.
- Prof. Arnold Smeulders received the *2017 ACM SIGMM Award*, a prestigious multimedia award for outstanding technical contributions to multimedia computing, communications and applications.
- The Faculty of Science Master's programmes *Logic and Security* and *Network Engineering* have been designated as 'Top Programme' by the Universities Study Guide 2017.
- Prof. Peter Sloot received the *Education Innovation Award* from the Russian Minister of Education and Science.

### Appointments

- Prof. Hamideh Afsarmanesh was appointed adjunct professor at Beijing Jiaotong University.
- Prof. Maarten de Rijke was appointed member of the Royal Dutch Academy of Arts and Sciences (KNAW).



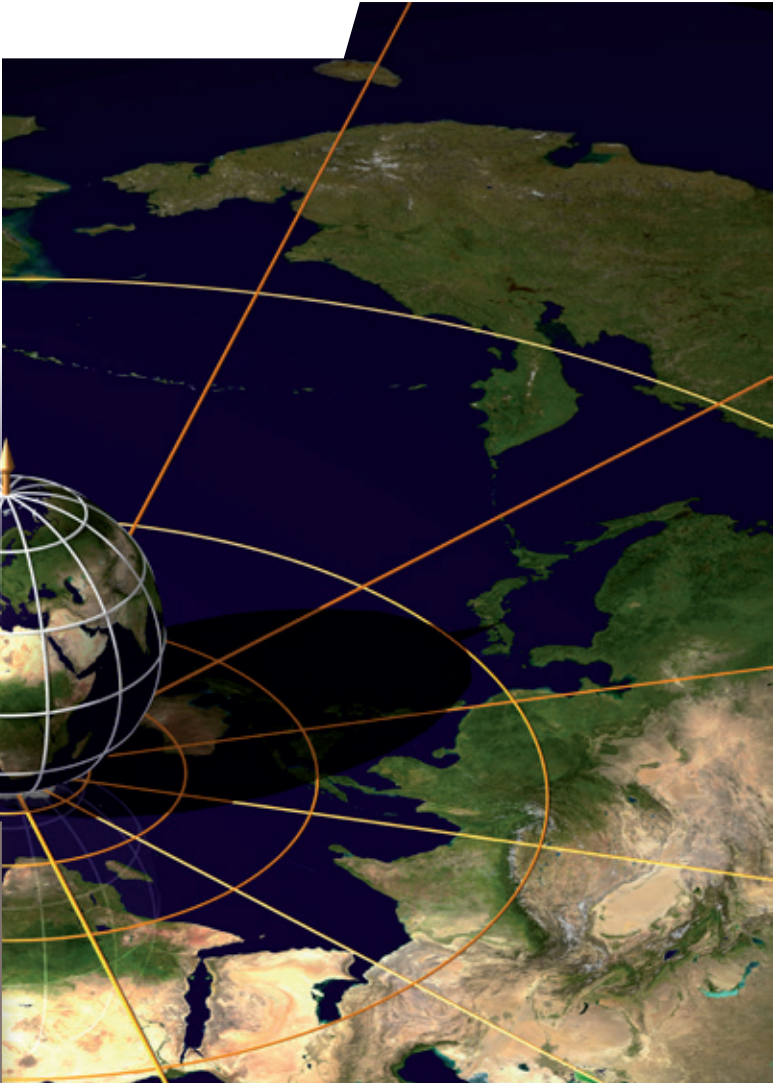
ICT and Data have become drivers of our society and economy. Informatics in Amsterdam is shaping the science behind them.

Prof. Marcel Worring, director of IVI



# Korteweg-de Vries Institute for Mathematics

The Korteweg-de Vries Institute advances the science of mathematics, both in its theoretical and applied aspects, and aims to stimulate the application and appreciation of mathematics in other academic disciplines and in society as a whole.



FIGURES

KdVI

Staff



FTEs

Full professors	9
Associate professors	9
Assistant professors	9
Postdocs	8
PhD candidates	26
Support and management staff	3

Doctorate conferrals



6

Publications



97

### Three cluster PhD positions awarded to KdVI

NWO has granted eight new PhD positions for projects within the mathematics clusters in the Netherlands. Three of these projects are at KdVI:

- *Sonja Cox and Asma Khedher (STAR)*  
Infinite-dimensional affine and polynomial preserving processes.
- *Jasper Stokman and Nicolai Reshetikhin (GQT)*  
Harmonic analysis on affine symmetric pairs and boundary correlation functions.
- *Arno Kret (Diamant)*  
Zeta functions of the Newton strata of Shimura varieties.

### The Maths Club

In September 2017, KdVI initiated 'De Wiskundeclub' (The Maths Club) for high school students. The aim of the club, led by Prof. Sergey Shadrin, is to show talented and motivated students the intellectual challenge and beauty of mathematics. About 30 participants from high schools in the Amsterdam metropolitan area attend the weekly meetings at the institute.

### NETWORKS

2017 was an important year for the national Gravitation project NETWORKS. In June 2017, the first large NETWORKS conference brought over 200 participants to Amsterdam for a two-day technical programme and a public event. The latter included a panel discussion with Dutch science policy leaders and the award ceremony of the Networks Challenge 2017 for high school students. Next to this, the Midterm Review took place. Both an international and a national review committee evaluated the overall progress of the programme. Their assessment was very positive, resulting in the continuation of the funding for the next five years.

### Grants and prizes

- TOP-grants were awarded to Prof. Sergey Shadrin, Dr Hessel Posthuma, Dr Raf Bocklandt and Dr Guido Carlet.
- Dr Michael Walter (QuSoft, KdVI/IoP/ILLC) received a Veni grant.
- Dr Jan Brandts was awarded the Honorary Medal for Mathematics of the Czech Mathematical Society in Prague.
- Prof. Michel Mandjes received an Discovery Grant of the Australian Research Council, together with Australian and Indian researchers.
- Prof. Gerard van der Geer received an Honorary Doctorate from Stockholm University for his contributions to research and education.
- The Master's programme Stochastics and Financial Mathematics was included in the Quant Guide 2017. Composed by Risk.net, the guide lists leading international Master's programmes in the field of Finance.
- Computer historian Dr Gerard Alberts, together with information scientist Dr Bas van Vlijmen, published a book on the history of the computer in the Netherlands.
- KdVI Teaching Awards were awarded to Dr Raf Bocklandt (best lecturer) and Jeroen Eijkens (best assistant teacher).

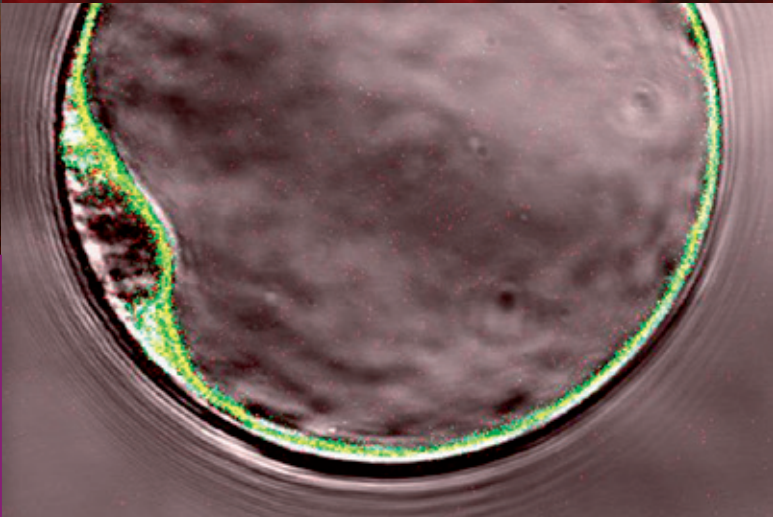
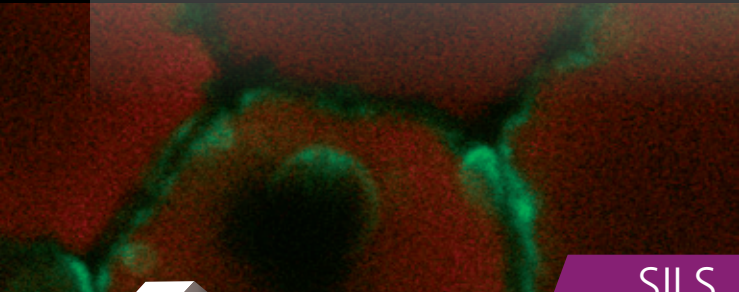
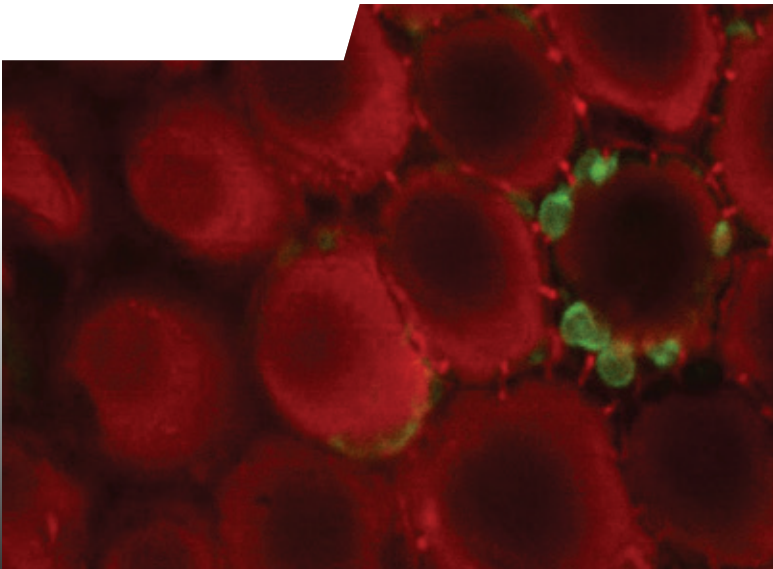


The high degree of national collaboration in mathematical research and education is an important asset. KdVI is proud to be the coordinator of Mastermath, the national mathematics Master's programme.

Prof. Eric Opdam, director of KdVI

# Swammerdam Institute for Life Sciences

Research at SILS spans the biological processes in humans, animals, plants and micro-organisms. The exchange of information and extension of research across disciplinary boundaries is a key characteristic of SILS.



Upper right and under left: Epidermal cells of the surface of a petunia petal. Red fluorescence is due to the pigments contained in the vacuoles of these cells. Green fluorescence comes from a GFP-labelled membrane protein (PH5-GFP, a marker of the tonoplast of the central vacuole and of additional vacuoles called “vacuolinos”). Upper left and under right: The same membrane protein labels in green the vacuolar membrane of an isolated petal cells (protoplast).

FIGURES

SILS

Staff



FTEs

Full professors

16

Associate professors

10

Assistant professors

30

Postdocs

32

PhD candidates

90

Support and management staff

48

Doctorate conferrals



24

Publications



177

### SILS spin-off Macrobian Biotech secures seed investment

The Faculty of Science, UvA Ventures Holding BV and Innovation Exchange Amsterdam (IXA-UvA) are jointly funding Macrobian Biotech BV, a biotech company that will further develop medicine for the treatment of Parkinson's disease. Macrobian Biotech is a spinoff company of SILS, founded by Dr Lars van der Heide and Prof. Marten Smidt.

### Flowers actively communicate with their environment

An international team of researchers, including Dr Robert Schuurink, discovered that flowers actively transfer molecules into the air to attract pollinators like bees and moths. For long it was thought that these so-called volatiles passively diffused from the flower petals. The results were published in *Science*.

### Microbes common denominator in efficient solar energy conversion

How do you convert solar energy into fuels and other chemical compounds on an industrial scale? In a quantitative analysis of the most promising strategies, researchers Dr Filipe Branco dos Santos and colleagues identified microbes as the key to efficient CO<sub>2</sub>-to-product conversion. The results of their study were published in *RSC Energy and Environmental Sciences*.

### Shedding light on protein interaction networks in a developing organism

For the first time, researchers have succeeded in mapping protein-protein interactions in living developing plant roots. This study, of which the findings were published in *Nature*, involved teams from the universities of Wageningen, Düsseldorf and Amsterdam. Dr Joachim Goedhart and Dr Marten Postma contributed with FRET-FLIM research (Förster Resonance Energy Transfer - Fluorescence Lifetime Imaging Microscopy) which was combined with genetics and gene expression analysis.

## Science

SILS researchers were involved in:

- The discovery of a mechanism that makes a common type of breast cancer cells resistant to a specific form of hormone treatment (*Nature Genetics*).
- The discovery of the vacuolino, a new organelle in plant cells (*Cell Reports*).
- The identification of a new type of 'GPS' neuron which might play a vital role in humans' ability to navigate their environments (*Nature Communications*).
- The observation of random motion of water in living cells (*Nature Communications*).

## Grants and awards

- SILS acquired new projects and contracts with a total value of €4.9 million. Among these grants are several NWO grants, EU projects and contracts with industry.

## Industry

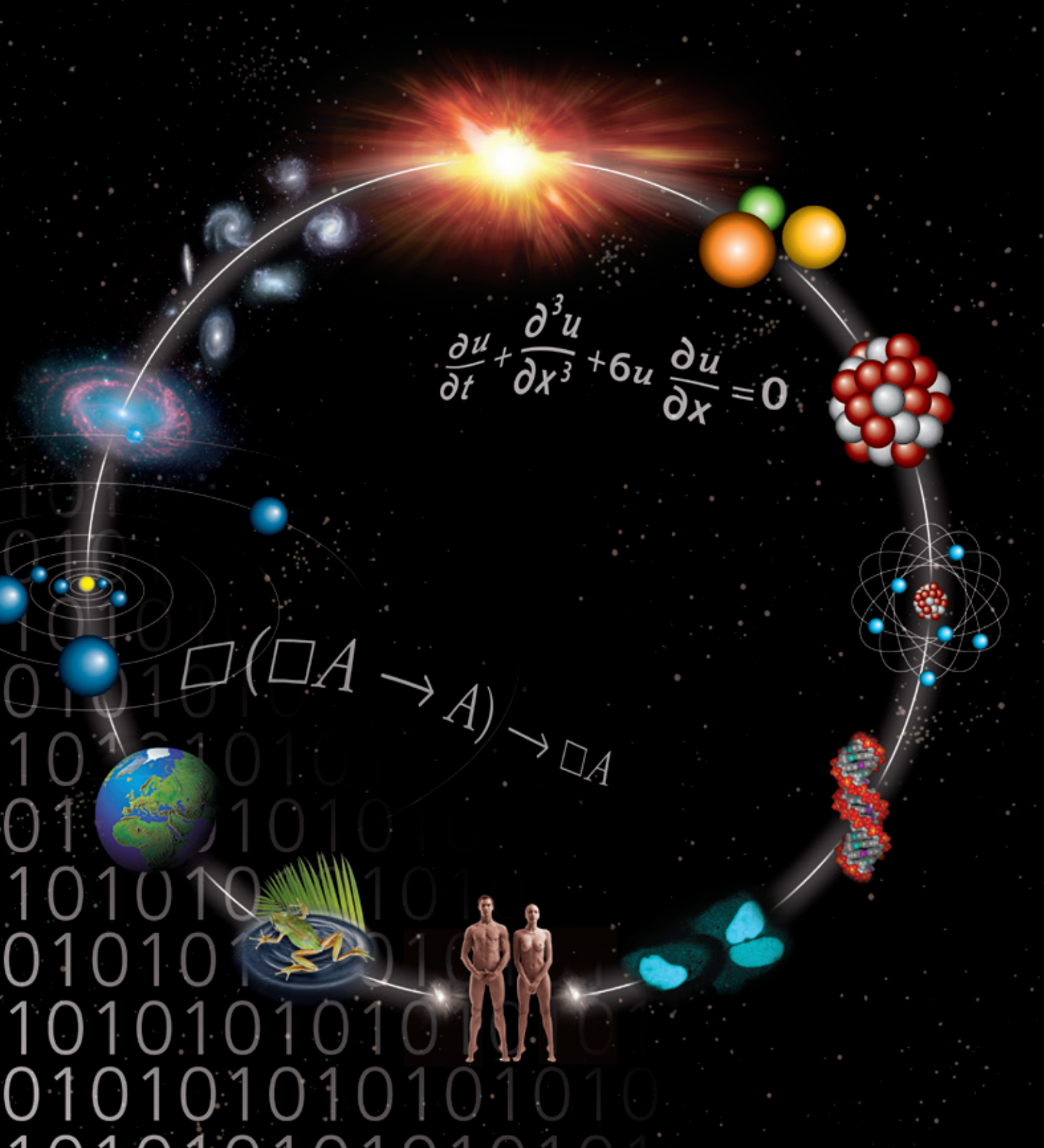
- SILS and Enza Zaden started a joint research project with the aim to investigate natural sources of resistance that can be introduced into crop plants by breeding.
- A programme for potato cultivation has been awarded funding to the amount of €1.5 million by OPZuid and the province of Zeeland. The funding is meant for the development of new techniques in potato cultivation regarding genetics, bioinformatics, Big Data, robotisation and drone-imaging.



A rejoined SILS is enthusiastically preparing itself for a prosperous future.

Prof. Marten Smidt, director of SILS







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April 2018

[www.uva.nl/science](http://www.uva.nl/science)

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