



Annual review

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Foreword

I am proud to see that 2016 was a year in which all Faculty of Science staff consolidated their consistently good work. Some results of this hard work you will see highlighted in the annual overview before you. For example the re-accreditation of the Bachelor's programmes Biology and Psychobiology and the Master's programme Biological Sciences with the highly satisfying and rare designation of 'good'. Or the widely publicised paper by Erik Verlinde on his new ideas on gravity. And of course, a selection of the many grants researchers at the Faculty of Science worked to obtain.

In some ways, 2016 was a year of big transitions for the Faculty of Science. Karen Maex left to become Rector Magnificus of our university, and I took over – first as acting dean and later as dean. Also in other regards the Faculty Board looks markedly different from a year ago: director of operations Maaïke Lürsen left to become secretary of the Board at AUAS and director of education Michel Haring left to focus on his research again. They have been succeeded in acting capacity by Mariska Enneking and Jan de Boer respectively.

But whether the fruits of this labour are singled out here or not, I find it heartwarming to see how dedicated everyone at our Faculty is to deliver high-quality research and teaching. Be it in the lab, writing a proposal, in front of a classroom, grading exams, or from a management or support position, your efforts make it possible for the Faculty of Science to excel.

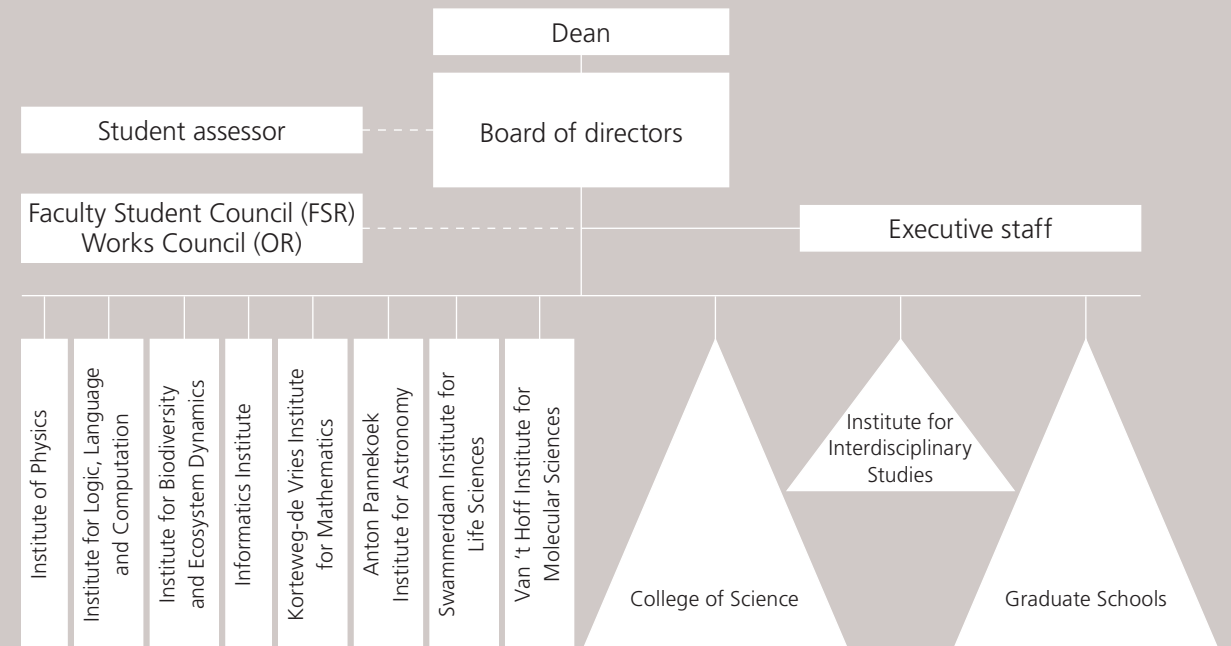


Prof. Peter van Tienderen
Dean of the Faculty of Science
University of Amsterdam



The Faculty's board of directors at the beginning of 2017

Left to right: **Mariska Enneking** is acting director of operations, responsible for the staffing policy, 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 and innovation. **Jan de Boer** is acting director of education, responsible for the courses offered and the organisation and quality of the teaching. **Rudi Rust** is director of finance, responsible for the planning and control, market development and project support portfolios. He is also responsible for ICT, the Technology Center and property development.



Students and lecturers at the Faculty of Science

In 2016 the Faculty of Science welcomed 1,293 new first-year Bachelor's students, a rise of almost 11% compared to 2015. In the Master's programmes, a total of 1,025 students enrolled at our Faculty. Currently, a total of 6,162 students are studying at the Faculty of Science.

The year saw impressive achievements by teaching staff at the Faculty of Science. To name a few, the Bachelor's programmes Biology and Psychobiology, and the Master's programme Biological Sciences, received the exceptional assessment of 'good' in their reaccreditation report from the Accreditation Organisation of the Netherlands and Flanders (NVAO). Marten Smidt (SILS), Coyan Tromp (IIS) and Rob Belleman (IvI) were awarded their Senior Teaching Qualification

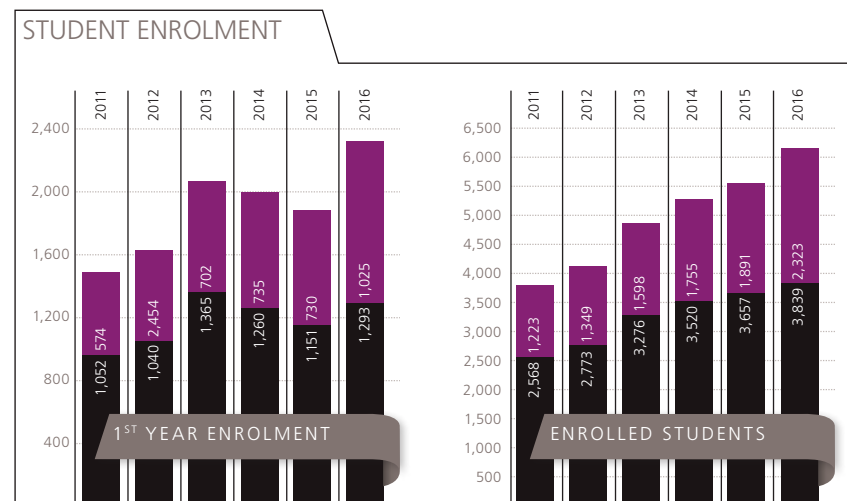
(SKO). And Ivo van Vulpen (Physics) and Martijn Stegeman (Informatics) received funding from the Ministry of Education, Culture and Science to set up an online course in Scientific programming skills for all Faculty of Science students.

Six joint degrees started

In September, six UvA-VU joint degrees commenced. Newly enrolled students in the Bachelor's programmes Chemistry or Physics & Astronomy, or the Master's programmes in Physics & Astronomy, Chemistry, Computational Science or Computer Science will receive their degree from both universities upon graduation.

Big History MOOC

The Institute for Interdisciplinary Studies (IIS) launched a Big History MOOC featuring 20 prominent UvA researchers, giving an integrated overview of the history of everything, from the Big Bang to now. The MOOC is freely available on Coursera, YouTube and Chronozoom.



UvA wins University Battle 2016

Team UvA, consisting of Biomedical Sciences student Boas van der Putten, and AUC students Tim Moolhuijsen and Sezgi Iyibilir, won the nationally broadcasted University Battle (Universiteitsstrijd) and earned the title of 'smartest university in the Netherlands'.

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 / 1,100 members / In May, NSA had a big celebration of our seventh lustrum. It was an exciting year, in which they organised the prestigious National University Mathematics Olympiad and went on a 19-day study trip to Japan.

ACD Chemistry / 414 members / For ACD, 2016 will be remembered as a year full of interesting lectures and excursions, topped by their study trip to Budapest where they got familiar with the beauty and culture of Hungary's capital. Additionally, they organised the symposium 'ACD on beauty', where we hosted many great speakers on cosmetic chemistry.

CONGO Biology, Biomedical Sciences and Psychobiology / ± 2,000 members / The year 2016 was yet again very successful for CONGO, with a lot of new, enthusiastic members and many great activities, including a study trip to Prague and their CONgress about senses.

VIA Information sciences / ± 1,500 members / In 2016, VIA celebrated its third lustrum and was selected to organise an international programming competition (BAPC). Furthermore, they attracted many more members than previous years and their study trip to Kraków was a great success!

Spectrum Natural and Social Sciences and Future Planet Studies / 888 members / Spectrum had a great year with lots of activities, for example a study trip to Romania and a symposium about happiness. Furthermore, Spectrum started celebrating its 20th anniversary which will end in May 2017, with two weeks full of activities.

GAOS Earth Sciences and Physical Geography / 120 members / In 2016, GAOS took its members on a trip to Denmark to study the countryside, visit Copenhagen and meet new people. Back home, several new committees were formed to improve GAOS through active student participation. Next year they will celebrate our 25th anniversary.

Cognito Brain and Cognitive Sciences / ± 150 members / In 2016 Cognito organised a symposium with the theme 'Minds and Machines'. Additionally, they are working on a more transparent and member-oriented organisation.

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 2,822 Bachelor's students.

Another 1,017 students are enrolled in one of the two Bachelor's programmes offered by the Institute for Interdisciplinary Studies (IIS).

Science in practice: students 'brewing' bread

Four students in the Natural and Social Sciences Bachelor's programme (IIS) developed bread from a beer brewery's waste product as part of the course *Science in practice*. Local brewery Oedipus and bakery Hartog's Volkoren assisted in the production. 'BrouwBrood' (BrewBread) tastes good, is healthy and, on top of that, sustainably produced.

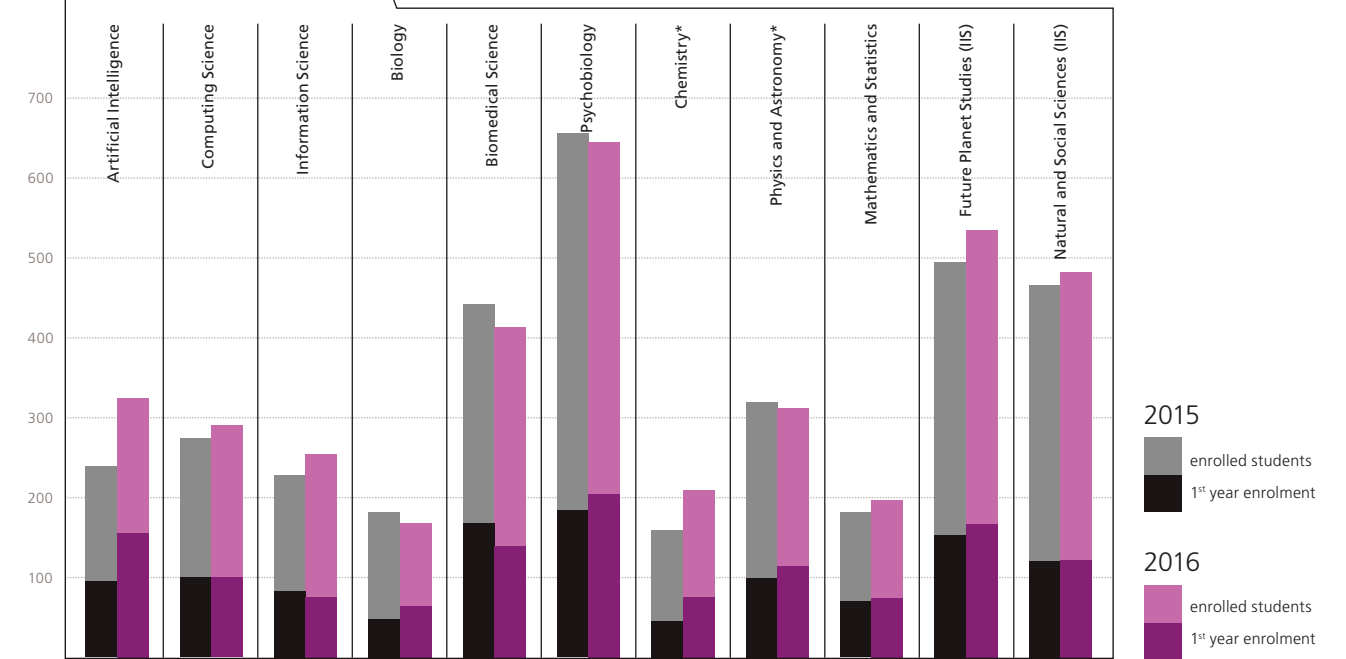
Young talent prize for four Bachelor's students

Four Bachelor's students at the Faculty of Science received the young talent prize from the Royal Dutch Society of Sciences (KHMW). Max Blans (Informatics), Mike Daas (Mathematics), Fenna van der Ploeg (Physics & Astronomy) and Boudewijn Zwanenburg (Chemistry) were the best first-year students of their study programme.

Gold for Faculty of Science student at International Mathematics Competition

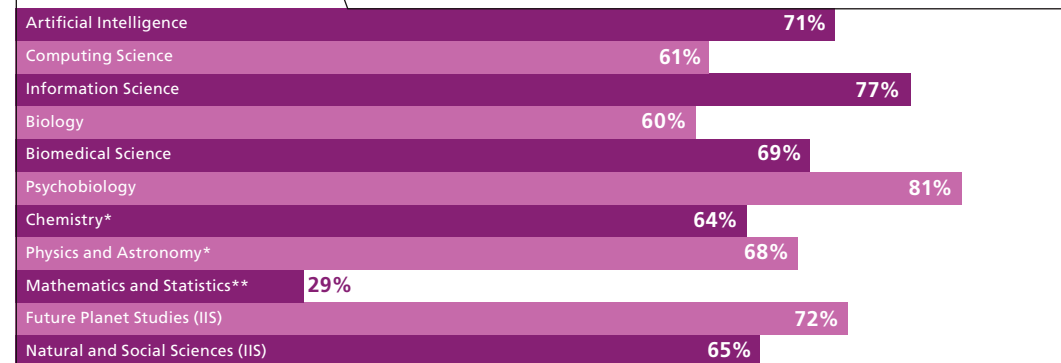
A delegation of Mathematics students from the Faculty won a total of nine medals at the International Mathematics Competition 2016 in Bulgaria. For the first time in the competition a UvA student, Bastiaan Znossen, won a gold medal. In addition, two silver medals and six bronze medals were awarded.

STUDENT ENROLMENT



*Joint programme with VU: the figures of 2015 pertain to enrolment at the UvA, in 2016 the figures pertain the students enrolled at VU and UvA jointly.

GRADUATION RATES



Diploma after four years. Degree programme commenced in 2012. Small cohorts may cause academic success rate to fluctuate.

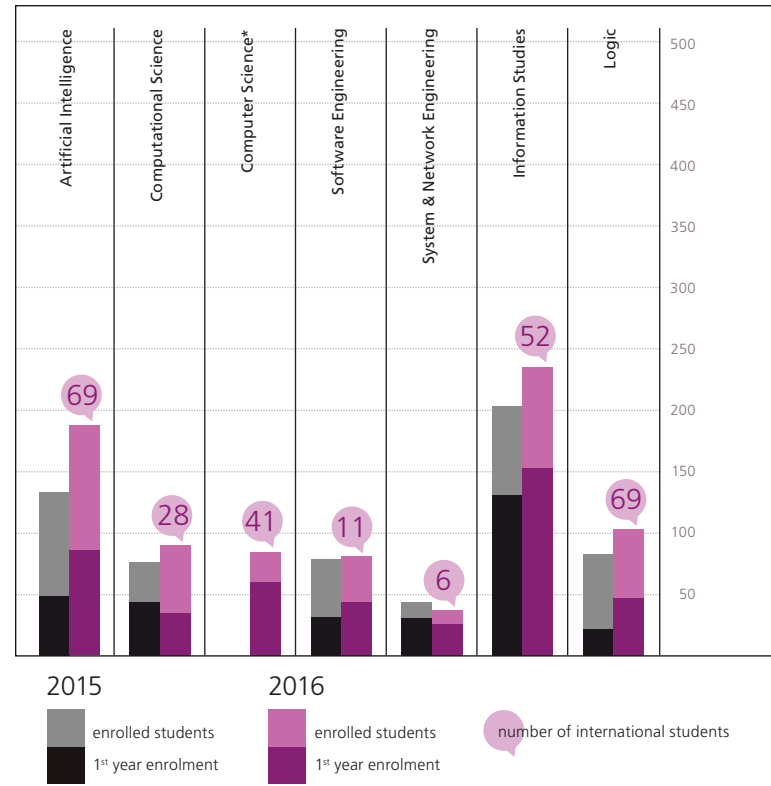
*Joint programme with VU.

**In these official numbers the double degree program Mathematics and Physics are not included. If they are, also Mathematics has a rate close to 70%.

Faculty of Science Master's programmes

The Faculty of Science's three graduate schools of Informatics, Science and Life & Earth Sciences provide education to approximately 2,105 students.

A further 218 students are enrolled in a Master's programme at the Institute for Interdisciplinary Studies (IIS).



Repeated 'Top Programme' honour for three Master's programmes

As in 2015, the Master's programmes Logic, System and Network Engineering (SNE) and Software Engineering were again crowned 'Top Programme' by the Universities Study Guide 2016. For the Master's programme Logic this is the fourth year in a row to achieve this distinction. It is also the second time that the SNE and Logic programmes were ranked among the Top 20 nationwide.

Esscher Prize for Master's student Earth Sciences

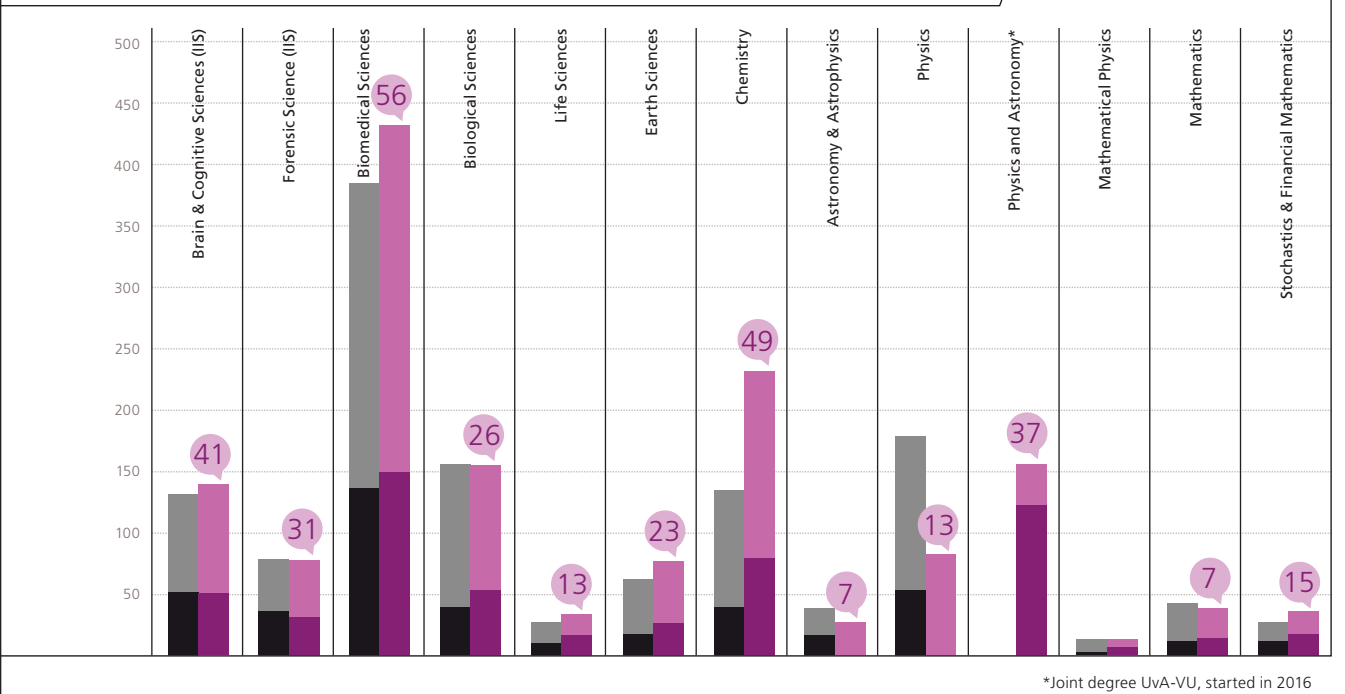
Frederique Kirkels (MSc Earth Sciences, track Geo-ecological Dynamics) won the Esscher Prize 2015 for the best Dutch Master's thesis in Earth Sciences. She carried out her research on organic carbon as source for CO₂ soil erosion under supervision of Dr Erik Cammeraat (IBED) and Prof. Karsten Kalbitz (TU Dresden).

Rare observation by Astronomy & Astrophysics Master's students

During their observation practicum with the Mercator telescope on La Palma, students of the Astronomy & Astrophysics Master's programme reported a strong optical outburst of a rare double star. The observation generated a lot of interest in the community and led to additional readings by several satellites.

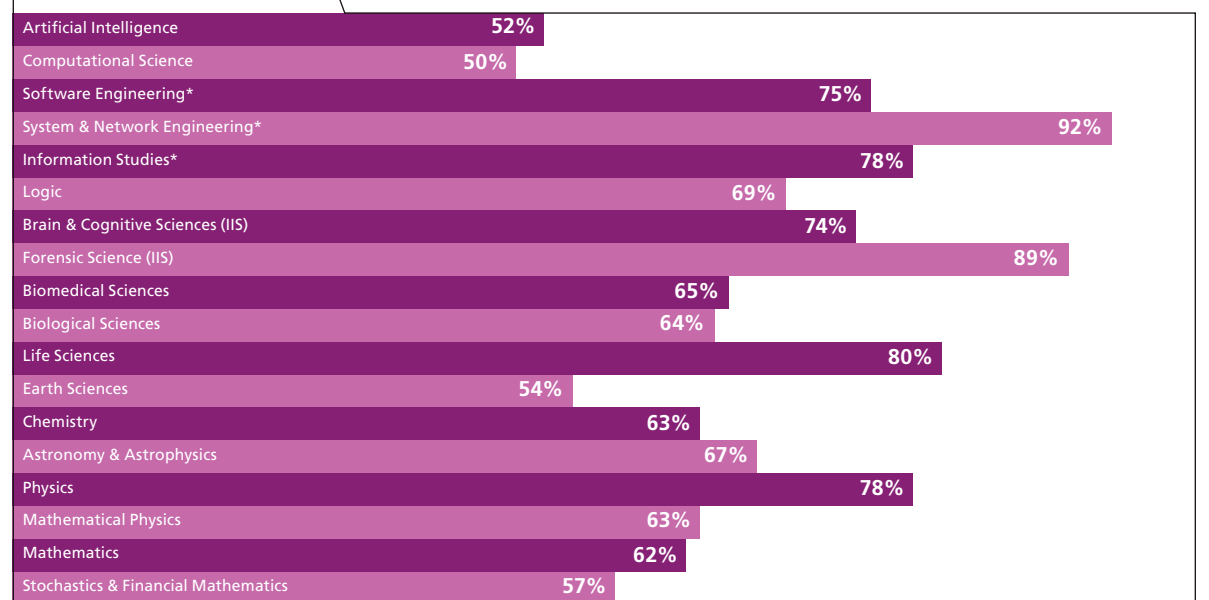


STUDENT ENROLMENT



*Joint degree UvA-VU, started in 2016

GRADUATION RATES



Diploma after second (one-year Master's)* or third year. Degree programme commenced in 2014* or 2013. 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 clients to develop and implement new educational methods.

IIS

FIGURES

Staff



FTEs

Teachers IIS	22
External teachers	3
Support and management	24
External support	8

Students	Programme	2015-2016
Bachelor	Future Planet Studies	535
Bachelor	Natural and Social Sciences	482
Master	Brain and Cognitive Sciences	140
Master	Forensic Science	78
Electives	Minor / Honours / Public	2,216

INTERVIEW

In 2016, as in previous years, IIS continued to develop new forms of learning. Lucy Wenting, director of the Institute, looks back and ahead.

More openness, more connections

‘Today’s hyperconnected world requires openness from the individual disciplines, and a willingness and ability to work together across disciplinary boundaries. If you want to be innovative – and we want to be, we have to be – you need to have guts. Taking risks, failing and making mistakes is all part of that. Together with the faculties, we try to venture off the beaten path. Complex issues require new approaches both in form and in content. By doing things this way, we are meeting the needs of a new generation of students.’

Targets for the next 5 years

‘We want to share our expertise even more widely, for example by having staff from other faculties work at our institute for periods of time – and vice versa. In addition to fostering greater understanding and knowledge sharing, this would inevitably bring about innovation at the interfaces of disciplines. My ideal would be to come up with as many different forms of learning and themes that can be incorporated into existing degree programmes as possible. This would result in a varied, hybrid, continuously-evolving portfolio of courses. More openness, more connections – that’s the direction the University of Amsterdam is headed towards. And isn’t that exactly what this world needs?’

Complex issues require new approaches both in form and in content.

Lucy Wenting, director of IIS

HIGHLIGHTS

Create a Course Challenge

For the Create a Course Challenge, IIS called for students to submit ideas for interdisciplinary courses adhering to the theme ‘Students without borders’. The competition was won by Linda van Exter, who now gets to develop her ‘Refugee Contextualization’ course together with IIS curriculum experts.

Master Data Science

Commissioned by the Informatics Institute (IvI), the innovative master track Data Science was developed together with the VU and Amsterdam Data Science. An international team of top-scientists and professionals from all participating organisations are lecturing in this track, where students are taught to translate scientific, societal and business challenges into data-related research.

Start minor Future NOW

In the intensive interdisciplinary minor Future NOW, students from all faculties of the UvA worked together in small groups on complex assignments from organisations like Amsterdam Trade Center, Stedelijk Museum, Refugee Company and UvA Real Estate.

The Faculty of Science in business and society

With our research, the Faculty of Science contributes to business and society in a multitude of ways.



In 2016, after years of planning, the grounds of Anna's Tuin, were readied for the upcoming growing season. Anna's Tuin, adjacent to Science Park 904, is one of the projects where partners of Amsterdam Green Campus will explore and develop urban agriculture practices.

Amsterdam Green Campus and Anna's Tuin

Amsterdam Green Campus, innovation platform for research, education and entrepreneurship in the green sector, kicked-off on 26 January. The platform, for which Michel Haring, Professor of Plant physiology at the Faculty of Science was one of the initiators, aims to play a key role in addressing current challenges such as food production and livability in growing urban areas.

Confocal

In 2016 UvA startup Confocal.nl began marketing the first-ever microscope with a plug-and-play feature. The microscope's rescan module offers super-resolution imaging for an even sharper focus on living cells. In July, the company and its scientific founder Dr Erik Manders (SILS) received an STW Take-off grant.



'Lactility' is an artist's impression of the human breast. Inspired by science, artists Roos Meerman and Lilian van Daal developed novel 3D printing techniques to construct an intricate network of passageways for the directional transport of liquids.

The art of science

At several occasions in 2016, the Faculty of Science explored the artistic side of science. In the run up to the Ars et Mathesis symposium hosted by KdVI, an exhibition of math-inspired art objects was displayed in the central hall of Science Park 904. UvA was also host of the Amsterdam edition of Imaginary, an interactive travelling exhibition displaying the beauty of mathematics.

In March, hundreds of scientists, art historians and conservators visited the 'Metal Soaps in Art' conference at the Rijksmuseum. Researchers from the UvA PAinT project, including chemists from HIMS, took part in the organising committee and presented the latest results of their research.

Forensic explosives intelligence

In a new project named FEXIN (Forensic EXplosives INTelligence), researchers from UvA, NFI and TNO joined forces to develop forensic chemical methods for improving post-explosion investigation methods. The Amsterdam-based part of the project is headed by professors Arian van Asten (NFI and HIMS) and Peter Schoenmakers (HIMS).

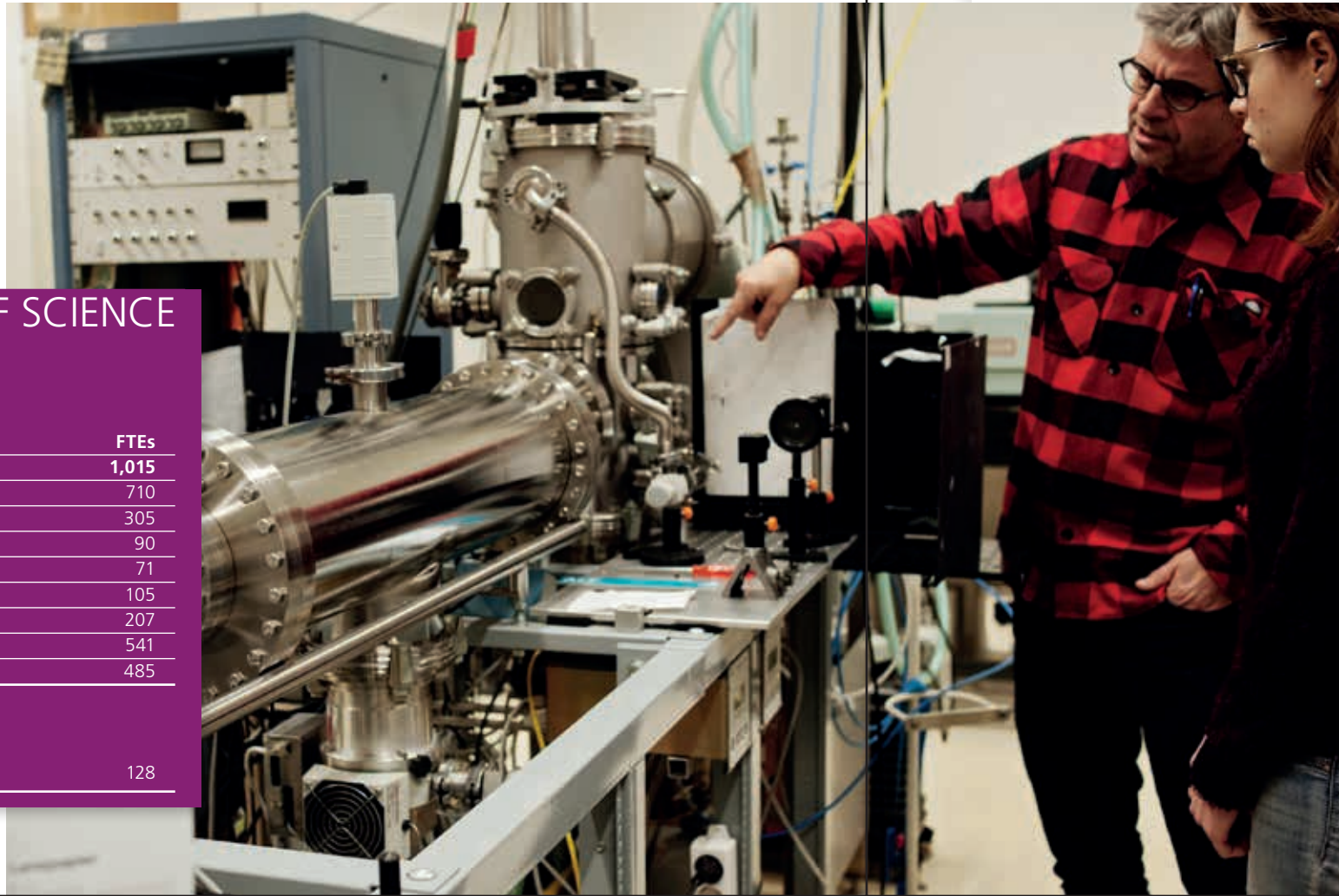
Popularising science

For their achievements in popularising their field of science, chemist Jan van Maarseveen and astronomer Joeri van Leeuwen received the 'KNCV Van Marumpenning' and the 'Willem de Graaff Prize' respectively.

Artists Lilian van Daal and Roos Meerman won a Bio Art & Design (BAD) Award for a project translating dynamic biological processes in the human body into products of 3D printing. Katrin Wiese and Renée van Amerongen (SILS) provided the scientific background and context for the 'Dynamorphosis – the beauty of inner mechanisms' project, which visualises the development of mammary glands. The winning installations were exhibited at MU Artspace in Eindhoven.


A broad spectrum of science research

The Faculty of Science is home to eight research institutes, each dedicated to their own field of research, thus covering a broad spectrum within the natural sciences. In several initiatives - such as QuSoft, Amsterdam Data Science, Networks, ARCNL, Co van Ledden Hulsebosch Centre, Solardam, Amsterdam Water Science and more - the institutes also work together and with external partners to address the grand challenges of today and tomorrow.



FACULTY OF SCIENCE

FIGURES

Scientific staff		FTEs
Total		1,015
Male		710
Female		305
Professors		90
Associate professors		71
Assistant professors		105
Postdocs		207
Lecturers and PhD candidates		541
Non-Dutch employees		485

Doctorate conferrals		
		128

HIGHLIGHT

Science Colloquium

In October, a very well attended Science Colloquium was held at the Faculty, where Kareljan Schoutens, Sander Woutersen and Gertien Smits gave presentations about the recently awarded Nobel Prizes in Physics, Chemistry, and Physiology and Medicine, respectively. In December, a Science Colloquium on Erik Verlinde's new theory of gravity drew an equally impressive crowd.

IN BRIEF

Grants in 2016

Veni, Vidi, Vici

- The Netherlands Organisation for Scientific Research (NWO) awarded Veni grants to ten researchers of the Faculty of Science. The grants, amounting to €250,000 for each research project, will give promising young researchers the opportunity to further develop their ideas over a period of three years. Laureates are: Arianna Bisazza (IvI), Enej Ilievski (IoP), Ties Korstanje (HIMS), Arno Kret (KdVI), Juan Pedraza (IoP), Thomas Russell (API), Silvia Toonen (API), Ping Zhou (API), Sita ter Haar (CoS, projects to be carried out at Universiteit Utrecht) and Martha Lewis (ILLC).
- Dr Mehdi Habibi (IoP), Dr Tiddo Mooibroek (HIMS) and Dr Katja Peijnenburg (IBED) 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. Sera Markoff (API), member of the GRAPPA Center of Excellence, was awarded the prestigious NWO Vici grant. Markoff receives the €1.5m grant for her project 'From micro- to megascales: understanding how black holes shape the local universe'.

ERC Starting, Consolidator and Advanced Grants

- The European Research Council (ERC) awarded Starting Grants to four researchers from the Faculty of Science: Jasper de Goeij (IBED), Diego Hofman (IoP), Fran Jacobs (SILS) and Selma de Mink (API). This individual grant, which is about 1.5 million euros for each project, offers talented young researchers the opportunity to set up their own research team and pursue groundbreaking ideas.
- Ben Freivogel (IoP) and Christa Testerink (SILS) were awarded Consolidator Grants by ERC. Amounting to €2m for each project, the grant allows researchers to position themselves as independent research leaders.
- Faculty of Science professors Peter Schoenmakers (HIMS), Albert Polman (IoP) and Huib Bakker (HIMS) received ERC Advanced Grants of €2.5m each. Advanced Grants are awarded on the basis of the scientific excellence of both the researcher and the research proposal.

Marie Curie Fellowships

Guglielmo Lockhart, Jakub Tomczak and Katrien Wiese were awarded a Marie Curie Fellowship, amounting to about €180,000 for each recipient, 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.



An international team of researchers led by Thomas Stolker MSc found very rich structures in planet-forming discs around young stars. They used the SPHERE instrument on ESO's VLT, which was partly developed at API. The structures may indicate the presence of newly formed planets, but could also be due to complex dynamics of the disc itself.

FIGURES

Staff	Icon	FTEs
Professors		3
Associate professors		8
Assistant professors		3
Postdocs		20
PhD candidates		41
Support and management staff		9
Doctorate conferrals		4

API

HIGHLIGHTS

Repeating fast radio burst

Dr Jason Hessels (API and ASTRON) played a leading role in an international team that discovered a repeating source in the very puzzling class of so-called *Fast Radio Bursts*. The discovery shows that these events cannot be catastrophic self-destructing events, but perhaps are hyper-strong pulsar outbursts instead (published in *Nature*).

Double black hole death dance

Based on the evolution of massive binary stars, Dr Selma de Mink together with Prof. Ilya Mandel (University of Birmingham) showed that the sources of detectable gravitational waves are likely to be very massive black holes, rather than neutron stars. Their model was proven right when in 2016 the first gravitational wave events were detected; the first two events were indeed massive black hole binaries.

Single black-hole vortex

Using the NuSTAR X-ray satellite, Dr Adam Ingram and colleagues showed that a rotating black hole forces space itself to rotate along with it (*frame dragging*). They did so by tracking X-ray emitting material moving through space towards the rotating black hole.

Cosmic rays from the Galactic Centre?

An international team including Dr David Berge and Dr Jacco Vink discovered a strong source of very high energy cosmic rays close to the centre of our Milky Way. They suspect that the massive black hole at the Galactic Centre is responsible (published in *Nature*).

IN BRIEF

Science news

- Dr Selma de Mink and Prof. Alex de Koter, amongst others, discovered nine extremely massive stars with the Hubble telescope.
- Astronomers including Dr Anna Watts found the first nebula around a magnetar using ESA's XMM-Newton telescope.
- Dr Christoph Weniger and colleagues explained how very fast-spinning pulsars are the source of excess gamma rays from the central regions of the Milky Way.

Grants and prizes

- ERC starting grant for Dr Selma de Mink.
- Vici grant for Dr Sera Markoff.
- *Pastoor Schmeits Prize* for Dr Jason Hessels.
- Veni grants for Dr Thomas Russell, Dr Sylvia Toonen, and Dr Ping Zhou.
- NWO and EU grants for Dr Michael Wise (SKA Science Data Centre).
- NWO TOP grants for Prof. Alex de Koter and Dr Jean-Michel Désert.
- *Willem de Graaff Prize* for Dr Joeri van Leeuwen.
- FOM award for best PhD thesis in physics for Dr Julija Bagdonaitė.

Appointments

- Dr Jason Hessels was inducted to the Young Academy of the Royal Netherlands Academy of Arts and Sciences.
- Prof. Michiel van der Klis was named chair of the ESA Astronomy Working Group.
- Prof. Lex Kaper was elected member of the EAS Council.

The Universe made waves in 2016.



Prof. Ralph Wijers, director of API

Van 't Hoff Institute for Molecular Sciences

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



HIMS

FIGURES

Staff	Icon	FTEs
Professors		14
Associate professors		8
Assistant professors		10
Postdocs		31
PhD candidates		62
Support and management staff		23
Doctorate conferrals		13

Sustainable Chemistry is a major research activity within HIMS. It is one of the 20 Research Priority Areas of the UvA representing the very best the university has to offer in terms of research and in which the UvA is a worldwide leader. The RPA Sustainable Chemistry focusses on important questions like: Can we use sunlight as a direct energy source in the production of chemicals and fuels? Can we design catalysts made from earth-abundant, cheap and non-toxic materials?

HIGHLIGHTS

Bayesian statistics

Detailed analysis of complex samples - such as food, body fluids or fire debris - requires advanced techniques for separation and mass spectrometry as well as smart algorithms. In a truly multi-disciplinary effort led by HIMS researchers, chemists, mathematicians and other scientists have applied Bayesian statistics to assign probabilities to the results of analytical measurements. Applications include medical diagnosis, food-safety assessment, sports-doping control, etc.

Molecular motors

In cooperation with molecular motors Nobel laureate Prof. Ben Feringa and Dr Wesley Browne from the University of Groningen, the Molecular Photonics group has discovered surprising details regarding the operation mechanism of light-driven molecular motors by means of ultrashort infrared pulses and quantum chemical calculations.

Hydrogen producing enzyme

In a collaboration between HIMS groups for homogeneous catalysis and molecular photonics, and as a part of the research programme of the Research Priority Area Sustainable Chemistry, a synthetic hydrogenase mimic was developed that contains a redox-active phosphole ligand as an electron reservoir. The latter feature is also crucial for the operation of the natural enzyme that produces hydrogen.

Bioinspired nanostructures

Computational chemists at HIMS, together with researchers from Utrecht University, established how the combination of mutual attraction, deformability and asymmetry is essential to form hollow nano shells in a novel colloidal model system. Their results, published in Nature, help to understand and design bioinspired nanostructures.

IN BRIEF

Science news

- **Amsterdam Green Campus** HIMS joined Amsterdam Green Campus with, amongst others, UvA, Amsterdam Economic Board, Greenport Aalsmeer and several universities for applied sciences.
- **Sustainability** HIMS and Research school HRSMC organised a Sustainable Chemistry workshop with a keynote address from former minister Prof. Jacqueline Cramer.
- **Entrepreneurship** A Sustainable Chemistry bootcamp was organised with ACE venture Labs. Three resulting spin-off companies may be founded in 2017.
- **ACID** Together with Innovation Lab Chemistry Amsterdam the first Amsterdam Chemistry Innovation Day (ACID) was organised.

Grants and prizes

- Prof. Peter Schoenmakers received an ERC Advanced Grant.
- Em. Prof. Ron Wever received the *Vanadis award*.
- 15 projects with HIMS applicants were granted by EU, NWO and Topsector Chemistry, amounting to 5.7 million euros. Six of these are in collaboration with and co-financed by companies.

People

- Dr Ariana Torres Knoop and Dr Danny Broere received their PhD Cum Laude.
- Dr Tiddo Mooibroek started as Vidi fellow.
- The group of Dr Chris Slotweg moved from Vrije Universiteit Amsterdam to HIMS.
- Prof. Gert-Jan Gruter was named professor by special appointment of Industrial Sustainable Chemistry.



The world is in the midst of a positive transition towards sustainability. Chemistry is at the heart of this transition. I am proud of HIMS' contribution.

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?



IBED

FIGURES

Staff



FTEs

Professors	10
Associate professors	9
Assistant professors	19
Postdocs	25
PhD candidates	49
Support and management staff	26

Doctorate conferrals



22

HIGHLIGHTS

Quantifying global biodiversity change

IBED researcher Dr Daniel Kissling is scientific coordinator of the EU horizon 2020 project *GLOBAL Infrastructures for Supporting Biodiversity research* (GLOBIS-B). After two international workshops with world-leading experts the project has made a major step towards building essential biodiversity variables (EBV's) quantifying global biodiversity change.

Blue-green algae handle changing climatic conditions

A team of IBED microbiologists led by Prof. Jef Huisman reported in *PNAS* how a common type of blue-green algae appears to be highly adaptable to Earth's rising CO₂ levels. Their results indicate that blue-green algae are even more adept at handling climate change than was previously thought. The findings can have implications for clean drinking water, swimming safety and freshwater ecosystems.

Spatial and environmental factors in construction of historical monuments discovered

Together with researchers of the University of New Hampshire, Dr Crystal McMichael identified important spatial and environmental factors relevant to the placement of historical monuments. The team applied the maximum entropy (MaxEnt) modelling technique, commonly used for the analysis of ecological data, to archaeological data. Their results were published in *PNAS*.

Migrant honey buzzards make maximum use of the prevailing wind currents

Migrant honey buzzards take long detours in order to make maximum use of the prevailing wind currents over northern Africa. Dr Wouter Vansteelant and other IBED researchers discovered this by combining GPS data from European honey buzzards with meteorological modelling. They published their results in *Journal of Animal Ecology*.

IN BRIEF

Grants

- Dr Astrid Groot received an NWO Earth and Life Sciences open programme grant for her research '*Understanding sexual selection: which sex leads the dance when both are signallers?*'.
- Dr Jasper de Goeij was awarded an ERC starting grant for his project SponGES to investigate the role of sponges in reef ecosystems and unveil a new type of food web with sponges as key ecosystem drivers.
- Prof. Willem Bouten and Dr Adriaan Dokter received a grant from the Dutch Ministry of Defence for their study of large-scale bird migration patterns combined with the development of a Bird Avoidance System for aviation.

Appointments

- Prof. Teun Boekhout was named professor by special appointment of Fungal Functional Diversity. He will focus on the (bio)functional diversity and natural niches of (pathogenic) fungi, including yeasts.
- Prof. Corina Brussaard was elected Fellow of the American Academy of Microbiology because of her expertise in the microbial ecology of coastal waters.

Valediction

- Prof. Steph Menken retired after a long and illustrious career with a valedictory lecture titled '*Change of food makes one eat: adaptation and species formation in plant eating insects*'.



Nothing is more important than air, water, soil, energy and biodiversity. These things keep us alive.



Prof. Peter de Ruiter, director of IBED

Institute for Logic, Language and Computation

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.



ILLC staff enjoying festivities at the Institute's 25th anniversary.

FIGURES		ILLC	
	ILLC total		of which Faculty of Science
Staff	FTEs		
Professors	10		4
Associate professors	9		6
Assistant professors	12		5
Postdocs	21		16
PhD candidates	45		31
Support and management staff	5		5
Doctorate conferrals	10		6

HIGHLIGHTS

Grant success at ILLC continues

2016 was again a successful year for project grants. ILLC researchers were awarded VENI and VICI grants, an ERC Starting grant and NWO-TOP and NWO-Large grants. This gave the ILLC research portfolio a substantial boost. Furthermore, as a result of the projects granted in 2015 & 2016, more than 50 new people have joined or will join ILLC - about half of them PhD candidates. We have therefore expanded our office space at Amsterdam Science Park.

ILLC celebrates 25th Anniversary

In November 2016, the ILLC celebrated its 25th Anniversary with an afternoon symposium on *Logic, Language and Information* and an evening party. About 200 researchers and students participated in the festivities.

Fenrong Liu awarded prestigious Chinese Professorship

Prof. Fenrong Liu of Tsinghua University, holder of the Amsterdam-China Chair in Logic, was awarded a Changjiang Distinguished Professorship by the Ministry of Education in China. The highly competitive national Changjiang Programme, founded in 1998, is considered to be China's most prestigious scholarly honour. Fenrong Liu is the first logician to receive this award.

IN BRIEF

Grants and prizes

- Prof. Arianna Betti was awarded a VICI grant of 1.5 million euros for her project *Ideas at Scale – Towards a Computational History of Ideas (e-Ideas)*.
- Dr Jakub Szymanik received an ERC Starting Grant of 1.5 million euros for his project *Cognitive Semantics and Quantities*.
- VENI grants were awarded to Dr Martin Lipman for his project *A Fragmented World: Foundations and Applications* and to Dr Martha Lewis for her research into *Metaphorical Meanings for Artificial Agents*.
- Prof. Arianna Betti, together with a consortium of scientists from UVA, VU, UU, Huygens, Municipal Archives Amsterdam, and the Netherlands Institute for Art History (RKD) received a total of 3.6 million euros for their NWO-Large project *Golden Agents*.
- Dr Raquel Fernández Róvira was awarded an Aspasia grant.
- Dr Benno van den Berg and Dr Ulle Endriss received NWO-TOP grants.

Appointments

- Prof. Sonja Smets was appointed professor of Logic and Epistemology at the Faculty of Science and the Faculty of Humanities. As of June 2016 she is also director ILLC.

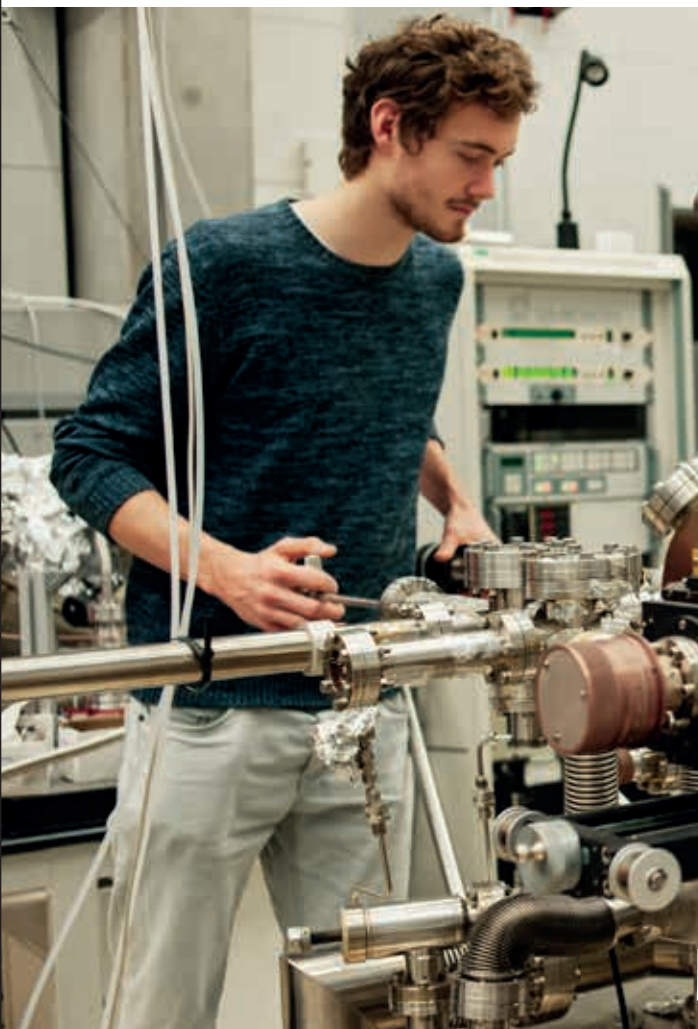


25 years of excellence in logic, language and computation has made us a strong, proud institute, with a bright future.

Prof. Sonja Smets, director of ILLC

Institute of Physics

The Institute of Physics (IoP) covers a broad spectrum of both experimental and theoretical physics. Topics range from (astro)particle physics and string theory to quantum condensed matter and soft matter.



FIGURES

IoP	
Staff	
	
Professors	21
Associate professors	13
Assistant professors	15
Postdocs	38
PhD candidates	106
Support and management staff	9
Doctorate conferrals	
	
	25



HIGHLIGHTS

SciPost Physics launched

The two-way open access scientific journal SciPost Physics was launched, an initiative of Prof. Jean-Sébastien Caux. The journal is part of the publication portal SciPost which handles a strict but transparent peer-reviewed selection method.

Erik Verlinde publishes new ideas on gravity

Prof. Erik Verlinde published a long anticipated research paper with his elaborated views on the nature of gravity and the (non-) existence of dark matter in the universe. The paper received much attention, both from physicists and the media, nationally and internationally.

Amsterdam investing in innovation and entrepreneurship

Together with the Municipality of Amsterdam, the departments of Physics of VU and UVA and NWO institutes Nikhef and AMOLF started the Innovation Exchange Amsterdam valorisation programme. It resulted, among others, in APRIL: the Amsterdam Physics Research and Innovation Lab. APRIL facilitates researchers and students with respect to feasibility studies on inventions, short-term studies for companies, and collaborations with private research laboratories.

Bert Vercnocke wins Dutch FameLab final

Good research becomes even more valuable when its results are made public in an appealing way. In FameLab, an international competition in science communication, young scientists give three-minute pitches about their research for a general audience. IoP-postdoc Bert Vercnocke won both the Amsterdam final and the Dutch final of this competition with pitches about his research on black hole physics.

IN BRIEF

Grants and prizes

- FOM 'project space' grants for Dr Katerina Dohnalová, Prof. Eric Laenen and Dr Marcel Vreeswijk.
- NWO grant for Prof. Rens Bod and Prof. Jeroen van Dongen for a project aiming at an interdisciplinary history of scientific knowledge.
- FOM Physics Poster Prize for PhD student Diego Cohen-Maldonado.
- Prof. Frank Linde was inducted to the Royal Netherlands Academy of Arts and Sciences (KNAW).
- Prof. Paul Planken was appointed fellow of the Optical Society of America (OSA).
- Dr Erik van Heumen, Prof. Mark Golden, Dr Alejandra Castro and the String Theory group participated in proposals receiving 2016 FOM 'free programme' funding.
- QuSoft, research centre for quantum software, awarded two junior research positions to be supervised by Dr Jasper van Wezel and Dr Erik van Heumen.

Appointments

- Prof. Auke Pieter Colijn was named Professor by Special Appointment in Experimental Astroparticle Physics at Utrecht University.
- Dr Daniel Baumann was appointed as Professor of Theoretical Cosmology.
- Dr Wouter Verkerke was named Professor by Special Appointment of Data Analysis in the field of Particle Physics and Astroparticle Physics.

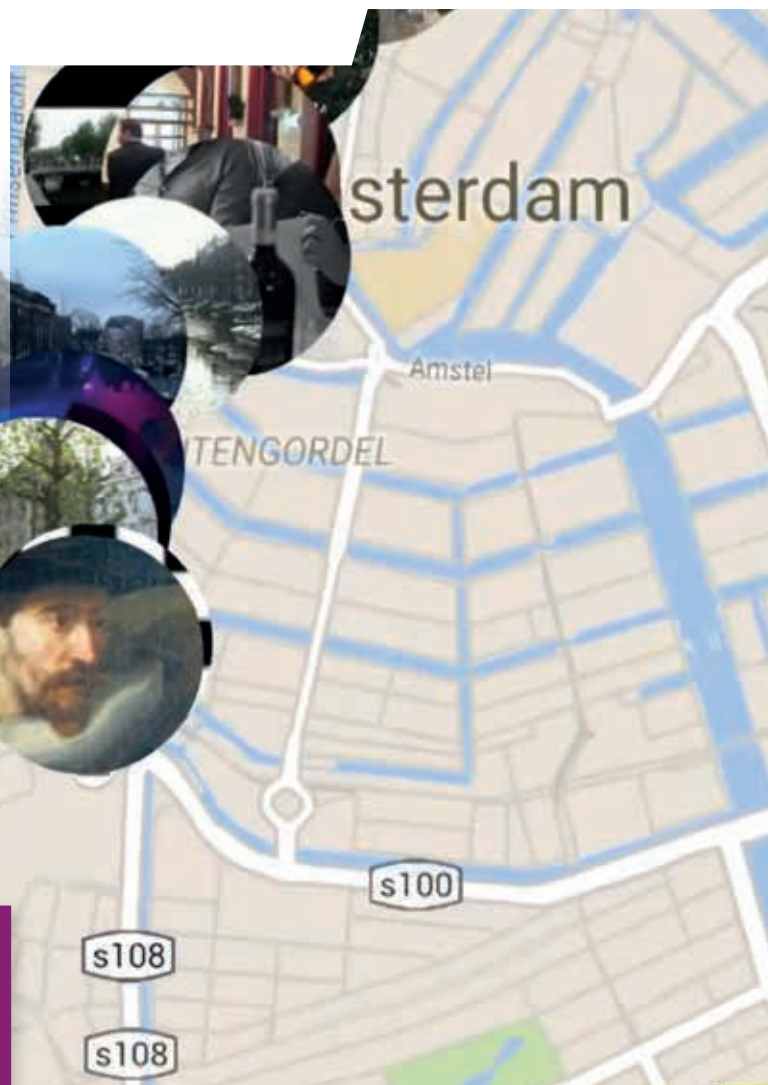


Science Park is rapidly becoming an international hotspot for physics research and education – we can't wait to have our VU colleagues join us!

Prof. Daniel Bonn, 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

Professors	10
Associate professors	7
Assistant professors	13
Postdocs	36
PhD candidates	64
Support and management staff	24

Doctorate conferrals



23

Scenemash is a system that generates content-based multimodal summaries of routes between locations in a city based on community-contributed images and their associated annotations from Foursquare and Flickr. The Scenemash prototype is implemented as an Android app for smartphones and smartwatches.

HIGHLIGHTS

Positive review on collaboration with VU in Computer Science

According to the national review committee Computer Science, the collaboration between the computer science departments of VU and UvA has the potential 'to become one of the worldwide leading institutes'. The year 2016 has been instrumental in creating the foundation for such a joint institute.

Funding for the Virtual Physiological Human

CompBioMed, a distributed Centre of Excellence in Computational Biomedicine, received H2020 funding from the European Commission to establish high performance computing within the biomedical modelling community. Prof. Alfons Hoekstra of the IvI Computational Science Lab participates in this research project that ultimately aims at the development of a 'Virtual Physiological Human'.

Data-driven prediction of gene perturbation

An international team of researchers including IvI computer scientist Dr Joris Mooij showed in PNAS that it is possible to infer gene regulatory relations in a purely data-driven way. They were able to establish which yeast genes change their expression when one of the genes is knocked out, based on a dataset of large-scale genome-wide gene perturbation experiments. This may well be the first convincing demonstration of automated causal discovery based on real-world data.

Horizon 2020 funding for Paola Grosso

Dr Paola Grosso received Horizon 2020 funding for two projects of which she is principal investigator. The grants amount to €220,000 and will boost networking research and experimentation in the areas of network programmability and network virtualization.

Arnold Smeulders one of most cited researchers worldwide

Prof. Arnold Smeulders belongs to the 300 most cited researchers in the field of Computer Science and Engineering according to the ShanghaiRanking's Global Ranking of Academic Subjects.

IN BRIEF

Valorisation

- Prof. Max Welling reached an agreement with Bosch on research on automotive data. As a result the so-called Boschlab will employ 10 PhD's starting in 2017.

Grants and prizes

- Prof. Martin Kersten received the SIGMOD Systems Award and was appointed as ACM fellow.
- Prof. Max Welling was awarded STW-Perspective funding for research on 'Deep Learning' in the area of medical imaging related to pathology, cardiology and ophthalmology.
- PhD candidate Zhaochun Ren MSc received the 2016 Chinese Government Award for Outstanding Self-Financed Students Abroad.
- The Dutch Nao Team of the UvA won the prize for Best Demo at the Benelux Conference on Artificial Intelligence.

Appointments

- Prof. Marcel Worring was appointed director of the Informatics Institute as of 1 September 2016, succeeding Prof. Jan Bergstra who retired on 14 December.
- Dr Rob van Nieuwpoort was named professor by special appointment of Efficient Computing for eScience. The chair was established with the support of the Netherlands eScience Center (NLeSC).
- On account of Stichting Bèta Plus, Dr Drona Kandhai was named professor by special appointment of Applied Informatics specialising in Computational Finance.

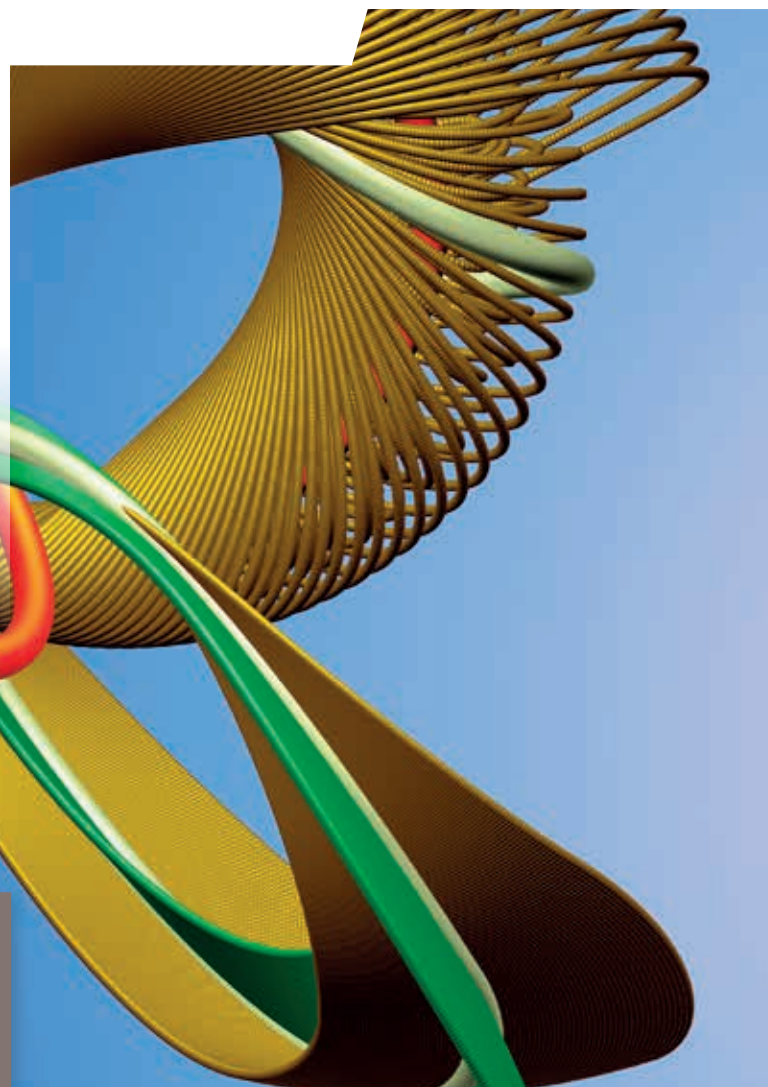


ICT and Data have become drivers of our society and economy. Informatics in Amsterdam is shaping the science behind them.

Prof. Marcel Worring, director of IvI

Korteweg-de Vries Institute for Mathematics

The Korteweg-de Vries Institute (KdVI) 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.



Anosov Flow at Imaginary exhibition

KdVI

FIGURES

Staff



FTEs

Professors	10
Associate professors	9
Assistant professors	9
Postdocs	8
PhD candidates	24
Support and management staff	3

Doctorate conferrals



9

HIGHLIGHTS

Research quality assessed as excellent

The national review committee on Mathematics assessed the research quality of KdVI as *excellent*. The group for Algebra, Geometry and Mathematical Physics stood out as *exceptional*. Regarding viability and relevance to society, the institute was qualified as *very good*. According to the committee KdVI is well positioned for the future with its high quality of research staff and a good age balance. The committee positively recognizes the collaboration with VU Amsterdam as an initiative where synergy and strengths can be gained.

UvA Quants event

In the fall of 2016 the first edition of the UvA Quants Event was organised by Dr Asma Khedher of KdVI in cooperation with the Institute for Informatics (IvI) and the Amsterdam School of Economics (ASE). It was the first step in exploring a stronger collaboration with the ambition to make Amsterdam a world leading centre on research and education in finance. Six partners from industry signed up and with almost 100 participants the event was considered a great success.

NETWORKS

In 2016 major steps were made in the national Gravitation project NETWORKS led by Prof. Michel Mandjes of KdVI. NETWORKS concerns the study of large-scale complex networks with techniques from stochastics and algorithmics. Substantial efforts were made to bring these disciplines closer together, amongst others through the exchange of PhD students. Setting up an outreach programme was another major focus, resulting in the web portal *networkpages.nl* and a summer school for high school teachers.

IN BRIEF

Dutch-Danish collaboration

A Memorandum of Understanding for cooperation in quantum research was signed by the Amsterdam research centre QuSoft and QMATH, the Villum Centre of Excellence for the Mathematics of Quantum Theory in Copenhagen

Grants and prizes

- TOP-grants for Prof. Rob Stevenson and Dr Viresh Patel.
- Veni grant for Dr Arno Kret.
- Dr Arnoud den Boer was awarded the *INFORMS Revenue Management and Pricing Section Prize* for papers on simultaneously learning and on optimizing selling prices from accumulating data.
- PhD student Madelon de Kemp won the *ASML Graduation Prize for Mathematics*, for her thesis on appointment scheduling in healthcare.
- KdVI Teaching Awards for Prof. Lenny Taelman (best lecturer) and Master's student Robben Riksen (best assistant teacher).
- Prof. Harry van Zanten (Mathematical Statistics) was named Fellow of the Institute of Mathematical Statistics (IMS).

Exhibitions

- KdVI hosted the exhibition and annual meeting of *Ars et Mathesis*, the Dutch platform for interaction between Art (*Ars*) and Mathematics (*Mathesis*).
- KdVI director Prof. Eric Opdam opened *Imaginary*, an interactive travelling exhibition of the Platform Wiskunde Nederland, displaying the beauty of mathematics.

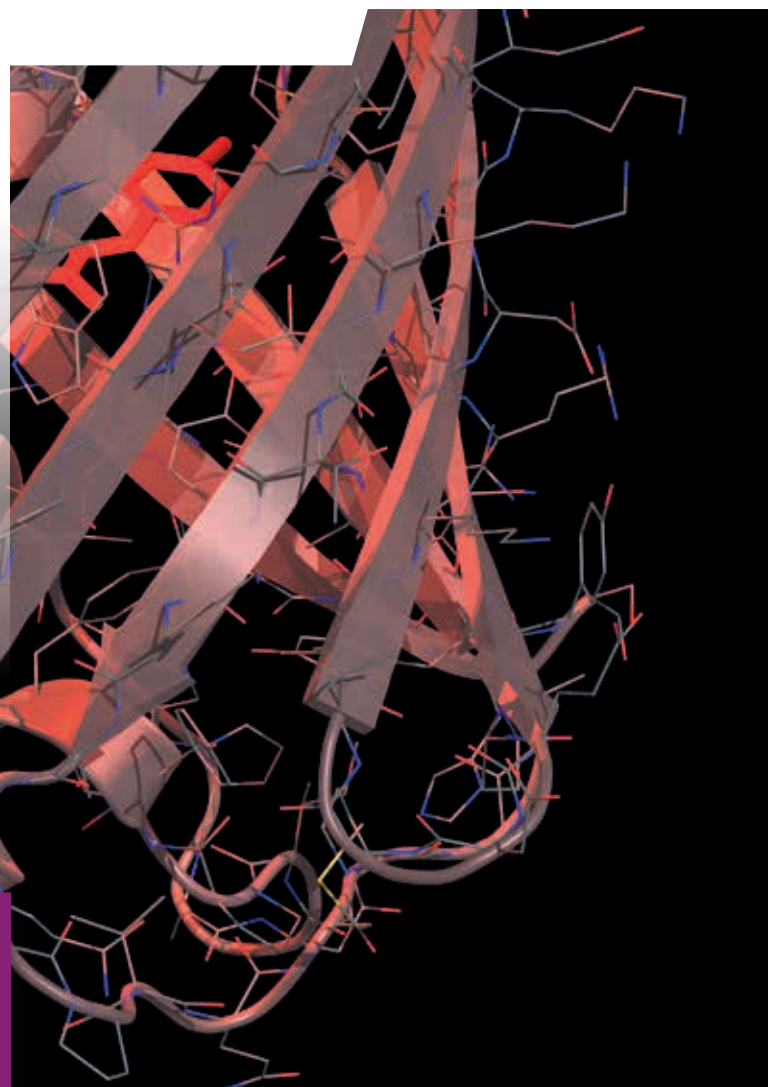


The inspiring exhibition Imaginary illustrates the beauty and the efficiency of mathematics.

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.



Atomic structure of mScarlet, the brightest monomeric red fluorescent protein developed to date.

SILS

FIGURES

Staff



FTEs

Professors	16
Associate professors	9
Assistant professors	30
Postdocs	34
PhD candidates	91
Support and management staff	52

Doctorate conferrals



27

HIGHLIGHTS

ERC Consolidator grant for Prof. Christa Testerink

Prof. Christa Testerink was awarded a 2 million euro ERC Consolidator grant for her project *Surviving Salinity: How do Plants Sense Na⁺?* It aims to reveal the drivers behind plant responses to salinity stress, and ultimately to establish what is required for coping with salinity. The research will open up new possibilities for agriculture, allowing crop growth on marginal, saline soils using improved sodium sensing modules.

ERC Starting Grant for Dr Frank Jacobs

During evolution the human genome has accumulated selfishly replicating DNA sequences called endogenous retroviral elements (EREs). Dr Jacobs will explore whether impaired control of certain EREs can lead to dysregulation of genes associated with neurological diseases, such as Alzheimer's disease.

All time high in funding

In 2016 the funding from grants and contracts added up to a total amount of 12.5 million euros. The majority of this newly obtained external funding will be spent in the coming few years.

Prof. Harro Bouwmeester joins SILS

In October 2016 Prof. Harro Bouwmeester joined SILS to start the 'Plant Hormone Biology' chair. His research on the role of plant hormones in the communication between plants and other organisms was jump-started with an ERC Advanced Grant and a grant from the Bill and Melinda Gates Foundation. It fits well with the research priority Green Life Sciences, as well as with the Amsterdam Green Campus.

In 2016, SILS went above and beyond expectations in life sciences research.



Prof. Marten Smidt, director of SILS

IN BRIEF

Science news

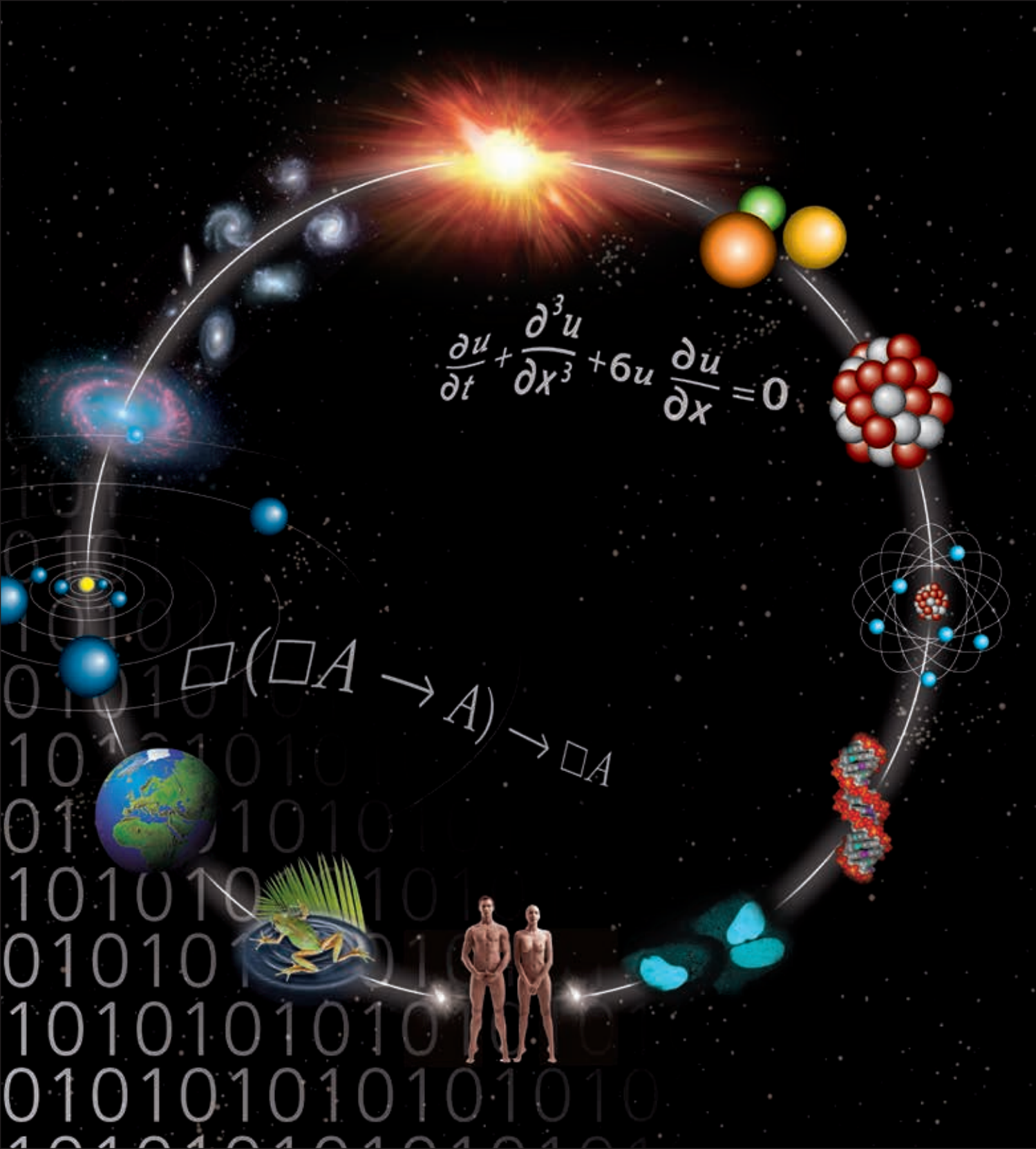
- Ricardo Paap published his discovery that the transcription factor FoxO6 affects radial migration during cortical development via Plxn4 in PNAS.

Grants and awards

- Filipe Branco dos Santos has been awarded a grant by NWO, with chemist Joost Reek, for the research into solar energy storage.
- Age Smilde and fellow researchers have received a Technology Area grant of €1.4 million, together with Dutch State Mines (DSM) and Unilever, to conduct research on the taste profile of foods.
- Natalie Cappaert and Aniko Korosi have each been awarded an Amsterdam Brain and Cognition (ABC) grant of over €250,000, for interdisciplinary projects.
- Renée van Amerongen was awarded €265,000 by the Dutch Cancer Society (KWF kankerbestrijding) and Katrin Wiese was awarded a two-year Marie Curie Individual Fellowship. They both also won a Bio Art & Design Award of €25,000 to bring the project 'Dynamorphosis' to life with two artists.
- Tanneke den Blaauwen acquired a €510,000 EU project. Aim of the project is to develop a new generation of antibiotics.

Appointments

- Christa Testerink, professor of Plant Cell Biology.
- Benno ter Kuile, professor by special appointment of Microbial Food Safety and Antibiotic Resistance in the Food Chain.
- Harro Bouwmeester, professor of Plant Hormone Biology.



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Editor
Pascale Nukoop

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Lydia Sprenger, Harm Ikink

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Struan McCall from UvAData

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