University of Amsterdam

Faculty of Science

2014

Annual review of the Faculty of Science

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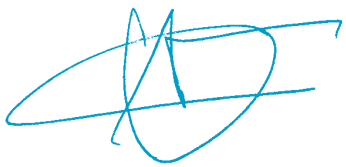
Foreword

The academic community is what makes a university. Together, staff and students create a place where science can flourish. I am proud of how research and education at our Faculty of Science are so closely interwoven. Not only are students introduced to the latest insights in their field, they also get to experience the enthusiasm, in-depth knowledge and passion that accompanies research. In turn, they inspire the researchers and ensure constant reflection on the education provided. In this way, we make progress together.

It is wonderful that we have once again had so many visible successes this year. At the same time, let us not forget about all the smaller steps being taken: a successful experiment, a student who has completed his thesis, a prospective student who is well prepared for her new programme, a PhD student who passes with distinction or a team of staff who are forging plans to ensure the future of the field at our Faculty.

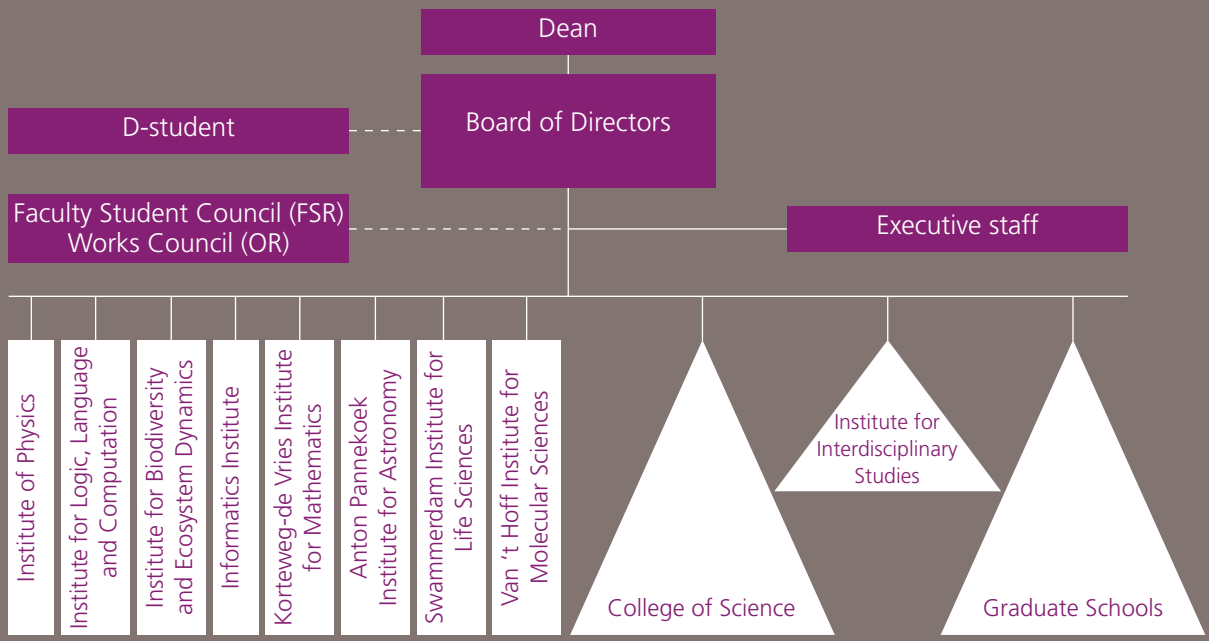
In 2014 the partnership between the University of Amsterdam (UvA) and VU University Amsterdam (VU) was reshaped, with academic content playing the leading role. Academics from similar disciplines are now exploring the possibilities and opportunities that more intensive cooperation will yield. Students are also taking part in this discussion. As dean of the science faculties of both universities, this is inspiring to see, although it inevitably creates various challenges. Thanks to the professional and positive attitude of all those involved, I have every confidence that, together, we can tackle these challenges and continue to make good progress in 2015.

Given the size of our Faculty and all the superb research and teaching that takes place here, it is impossible to enumerate all of our accomplishments in 2014; this booklet singles out a few of the highlights.



Prof. Karen Maex
Dean of the Faculty of Science
University of Amsterdam

The Faculty's board of directors (left to right): Rudi Rust, Maaike Lürsen, Karen Maex, Peter van Tienderen, Michel Haring



The Faculty's board of directors

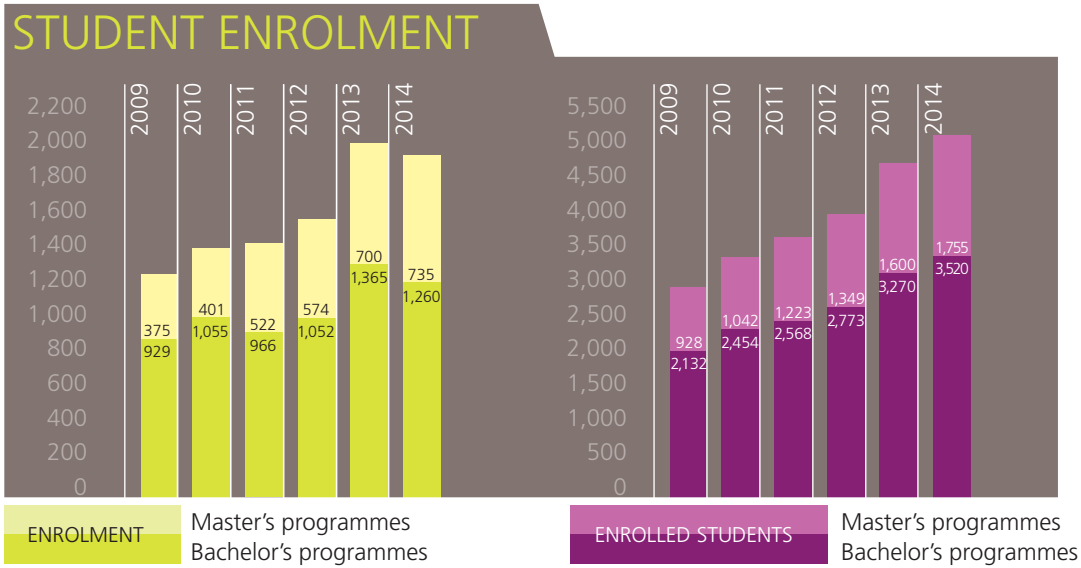
Rudi Rust is director of finance, responsible for the planning and control, market development and project support portfolios. **Maaike Lürsen** is director of operations, responsible for the staffing policy, ICT, accommodation, and occupational health, safety and environment portfolios. **Karen Maex** is dean and president of the Faculty's board of directors. **Peter van Tienderen** is vice dean and portfolio holder for research and valorisation. He is also responsible for PhD student policy. He is the first replacement for the dean. **Michel Haring** is director of education, responsible for the courses offered and the organisation and quality of the teaching.

Students and lecturers at the Faculty of Science

Science is more popular than ever and students are satisfied with their degree programmes.

Student enrolment has been growing for years. To safeguard quality, the Bachelor's programme in Psychobiology instituted an enrolment quota in 2014, a new lecture room for 200 auditors was added in the summer and external rooms were leased. All programmes at the Graduate School of Informatics received a good to very good rating in the quality assessment conducted by the Accreditation Organisation of the Netherlands and Flanders (NVAO), and Logic was even awarded the status of 'excellent'. Several students from the Faculty also received awards, including the UvA Thesis Prize, and won medals at the International Mathematics Competition (IMC). Dr Ulle Endriss was the Faculty winner of the UvA Lecturer of the Year award.

STUDENT ENROLMENT



Entrepreneurship

Students and alumni co-wrote *Anna's Ruigte en Tuin*, a nature development plan for 1.5 hectares of nature and permaculture between Science Park and the A10 ring road, aimed at increasing the plot's natural value both as a picturesque spot for the Science Park community and as a 'living lab' for research and education.

Alumni chapters

On the 125th Amsterdam Student Association (AUV) Day, the annual UvA event for alumni, three new chapters were founded for Faculty of Science alumni. An umbrella chapter was established for the entire Faculty, while Biology and Biomedical Sciences also launched their own alumni networks.

UvA Thesis Prize

Taco Cohen and Jacco de Vries, both students in the Artificial Intelligence programme, won first and second place in the UvA Thesis Prize competition. According to the jury, Cohen's thesis marks 'a start to creating a standard model for machine learning'. Cohen is now a PhD student at the Informatics Institute.

Study associations in 2014

The FSR and seven study associations provide a warm welcome to new students, support them during their studies and organise additional educational activities; most of all, however, they see to it that thousands of students enjoy their time at university.

VIA *Informatics / around 1,500 members /* Many first-year students have joined the association, which has led to the establishment of several new committees. They introduced their own 'lecturer of the year' award and had the largest number of trip participants.

CONGO *Biology, Biomedical Science and Psychobiology /* around 2,200 members / For the first time, the association held an information evening about studying abroad. As well as providing practical information, a number of students talked about their personal experiences abroad during this well-attended event. In 2015, the Faculty of Science plans to organise this evening in conjunction with the International Office.

Cognito *Brain and Cognitive Sciences / 107 members /* In addition to the success of recurring activities such as the Brain Slicing Event and *Weekend Weg*, Cognito's year was highlighted by new initiatives, which included brewing their own beer, participating in the 'bèta break quiz' and publishing their first yearbook.

NSA *Physics, Astronomy and Mathematics / 1,050 members /* Membership in the NSA has grown considerably as it is now the study association for all physics students in Amsterdam. The association organised a variety of activities including business workshops, lectures and its traditional games afternoons.

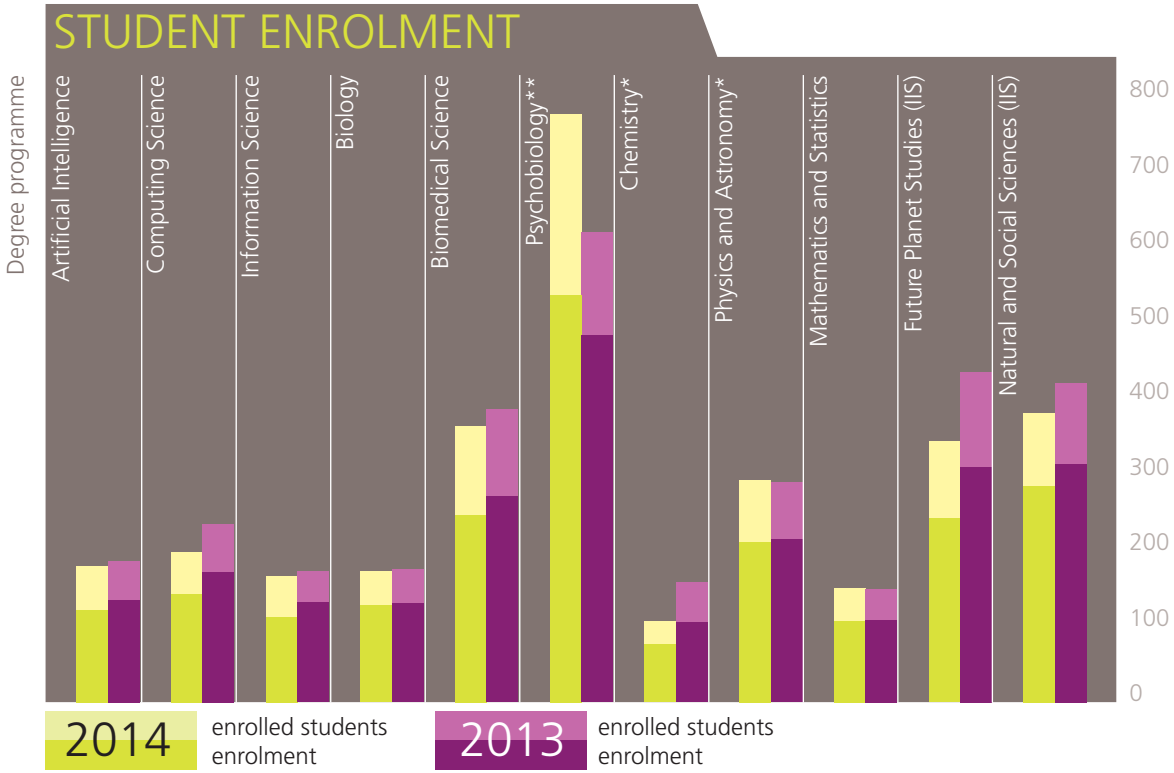
ACD *Chemistry / 292 members /* Many lectures and excursions were organised in 2014. ACD visited Tata Steel and Akzo Nobel, amongst others, and invited a representative from the Energy Research Centre of the Netherlands (ECN) to give a lecture at Science Park. Fifty members also went on a trip abroad to Turin, Italy, where they visited the university, a few companies and a wine tasting.

Spectrum *Natural and Social Sciences and Future Planet Studies / 713 members /* Spectrum has added Future Planet Actions, a sustainability track for first-year Natural and Social Sciences and Future Planet Studies students. Spectrum also celebrated its anniversary for the first time, with current and former members getting together to celebrate the association's 18th year.

GAOS *Earth Sciences and Physical Geography / 105 members /* GAOS organised a trip to Scotland in 2014. During this 12-day trip, members learned about the culture, nature and geological characteristics of the country. Over a glass of Scotch, they got to see with their own eyes how the landscapes have been formed over millions of years.

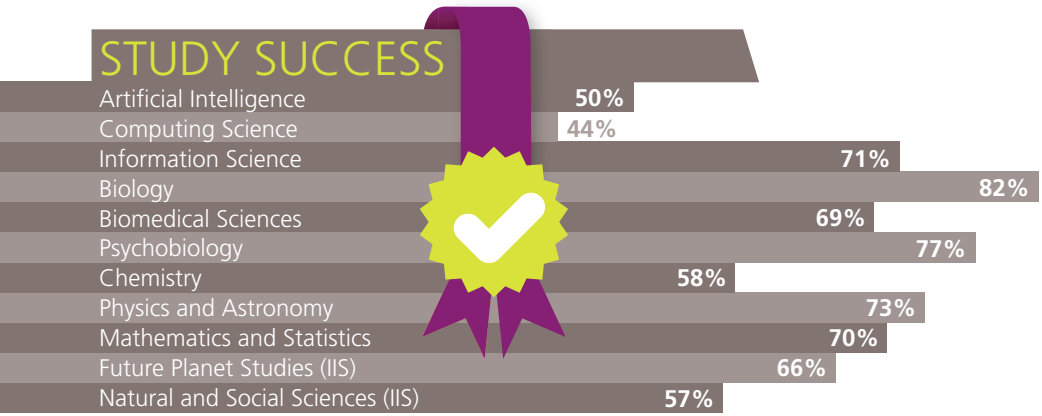
Faculty of Science Bachelor's programmes

STUDENT ENROLMENT



*Joint programme with VU: these figures pertain to enrolment at the UvA. **Enrolment quota instituted in 2014

STUDY SUCCESS



Diploma after four years; degree programme commenced in 2010; small cohorts may cause the academic success rate to fluctuate.

More than 2,600 students were enrolled in the Bachelor's degree programmes at the College of Science, which span the entire science spectrum. Some further 900 students were enrolled in programmes at the Institute for Interdisciplinary Studies (IIS).

UvA and VU offer joint Bachelor's in Physics and Astronomy

As of September 2014, students can enrol in a Bachelor's degree programme in Physics and Astronomy offered jointly by the Amsterdam universities. Amsterdam is now home to the most comprehensive Physics and Astronomy Bachelor's programme in the Netherlands, offering students a good grounding in the diversity of this field. The programme will be introduced in phases: the first year began as a joint cohort in 2014 and the entire programme will be run jointly by the UvA and VU in 2016. This is the second Bachelor's programme (after Chemistry) that is being offered jointly.

Three Chemistry Nobel laureates visit Amsterdam

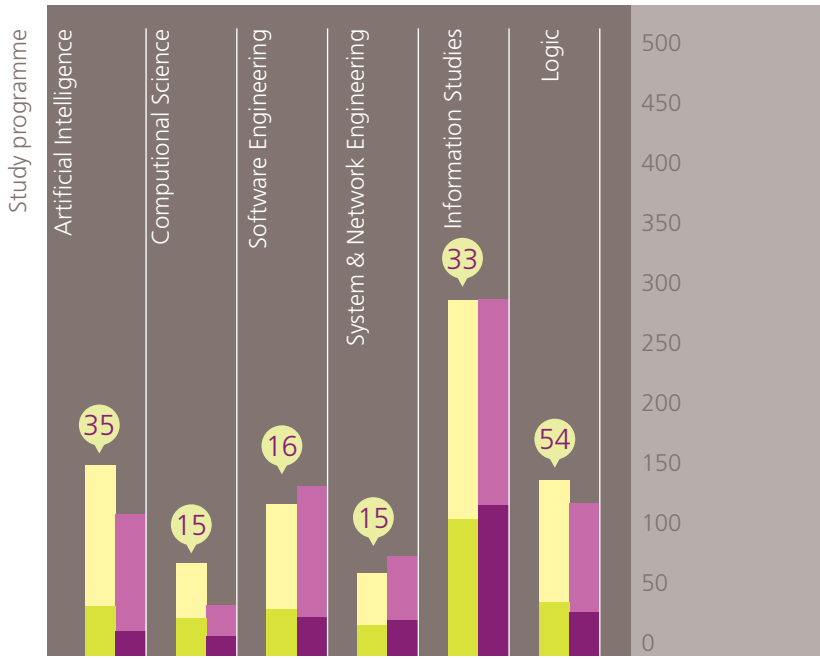
The Nobel laureates W.E. Moerner (2014), Arieh Warshel (2013) and Roald Hoffmann (1981) visited the students of Bachelor's programme Chemistry in November. All three laureates made an appeal for basic research, in which they were joined by Karen Maex, dean of the science faculties of the UvA and VU: 'Real fundamental research leads to finding the unknown, the unexpected. As such it is key to groundbreaking innovation.'

Incentive prize for five first-year students

On 28 November 2014, Jeremy van der Heijden (Mathematics), Xanthe Verbeek (Physics and Astronomy), David Veenstra (Informatics), Diewertje Modder (Chemistry) and Tom Roose (Chemistry) each received an incentive prize worth 500 euros. The Royal Holland Society of Sciences and Humanities (KHMW) awarded this prize to a total of 51 young talented students in the natural and technical sciences. Of these 51 students with the best marks this year, over half had an average of 9 or higher in their examined subjects.

Faculty of Science
Master's programmes

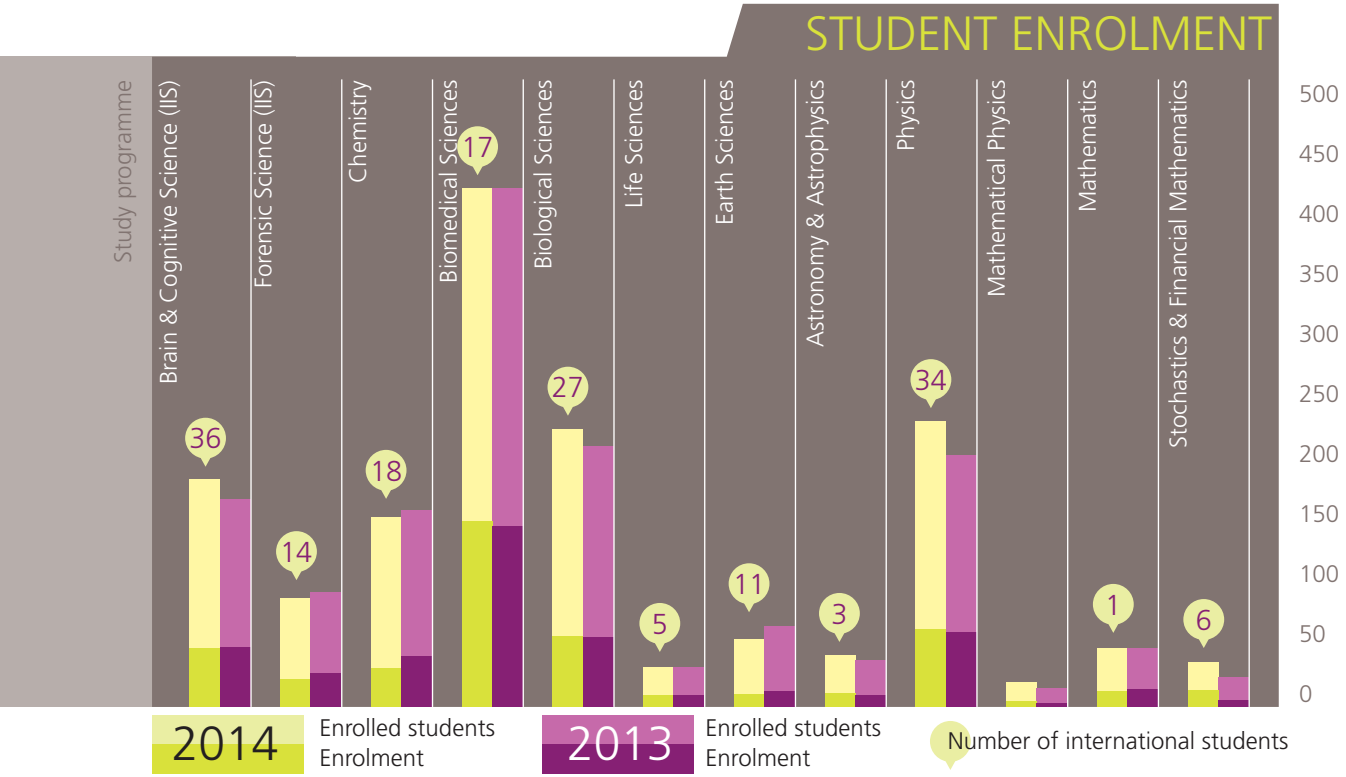
Master's programmes at the Faculty of Science are based at three graduate schools: Informatics, Science and Life & Earth Sciences. In 2014, more than 1,700 students were enrolled in these Master's programmes combined. A further 200 students were enrolled in Master's programmes at the Institute for Interdisciplinary Studies (IIS).



STUDY SUCCES

Information Studies*	74%
System & Network Engineering*	88%
Software Engineering*	79%
Computational Science	38%
Artificial Intelligence	59%
Logic	74%
Brain & Cognitive Science (IIS)	69%
Forensic Science (IIS)	71%
Chemistry	39%
Biomedical Sciences	71%
Biological Sciences	71%
Life Sciences	50%
Earth Sciences	62%
Astronomy & Astrophysics	75%
Physics	67%
Mathematical Physics	50%
Mathematics	50%
Stochastics & Financial Mathematics	71%

Diploma after second (one-year Master's)* or third year; degree programme commenced in 2012* or 2011; small cohorts may cause the academic success rate to fluctuate.



Amsterdam Science Talent Scholarship (ASTS)

The Faculty of Science seeks to attract talented Master's students. In 2014, it therefore began offering full scholarships of €10,000 per year for highly talented students wishing to enrol in a science Master's programme at the UvA. This scholarship is for students who are residents of the European Union and covers tuition fees and part of their living expenses.

Top Master's programmes according to Options Guide 2014

The Master's programmes in Logic and in Astronomy and Astrophysics were ranked as two of the 'Top 15 best Master's programmes' in the 2014 Options Guide for Master's Programmes. This Top 15 is based on information from the National Student Survey (NSE) and on accreditation decisions made by the NVAO.

Students present glacier research to King Willem-Alexander

In December, students Darko Radakovic and Rachael Chambers of the Master Earth Sciences presented the results of a glacier experiment to the Dutch king Willem-Alexander at an event marking 50 years of European cooperation in space. Earlier in the year they had performed a unique glacier experiment inside ESTEC's research centrifuge to study the effects of gravity on the flow of ice at the surface of Mars.

Institute for Interdisciplinary Studies

IIS

FIGURES

Staff	FTEs
Teaching IIS	47
External teaching	24
Support management and staff	20
External support	10

Students	Programmes	2013-2014
Bachelor	Future Planet Studies	459
Bachelor	Natural and Social Sciences	465
Master	Brain and Cognitive Sciences	138
Master	Earth Sciences	45
Master	Forensic Science	66
Electives	Minor/Honour's/Public	2,493

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The Institute for Interdisciplinary Studies (IIS) is the UvA's knowledge centre for interdisciplinary learning and teaching and develops new programmes and courses in collaboration with the faculties. The IIS has more than 15 years experience in interdisciplinary education and continuously develops substantive education innovations with an interdisciplinary character. The institute identifies new themes and issues linked to current developments in academia and society.

Over 1,100 students study full-time at the IIS. The IIS offers Bachelor's programmes in Natural and Social Sciences and in Future Planet Studies, a Master's in Forensic Science and a Research Master's in Brain and Cognitive Sciences. It also offers electives (minors, Honours modules and various public activities) for around 2,500 students. All its activities are interdisciplinary in nature and designed in collaboration with one or more faculties.

Teaching Lab

With a pivotal role in experiments, publications, manuals and inter-disciplinary education methods, the Teaching Lab plays a key role in implementation and innovation. The lab organises workshops on designing and bolstering interdisciplinary programmes for programme directors and lecturers and advises on various innovation programmes, among other things.

Politics, Psychology, Law and Economics

In September 2014 a group of 95 Bachelor's students started the new English-taught interdisciplinary programme in Politics, Psychology, Law and Economics (PPLE). The students' results are very promising.

Pressure cooker

Students from various disciplines jointly examine a social problem and come up with practical solutions within the space of two and a half days, working closely with external stakeholders and trainers. For example, students look at what brain and cognitive sciences can contribute to the legal system for the Ministry of Justice.

Hacking healthcare

Future healthcare professionals and artists work in interdisciplinary groups on solutions to concrete challenges in healthcare. Teachers from the academic and healthcare fields introduce today's challenges in healthcare, training participants in social design skills and creativity.

'Innovation is uncharted territory, there's no recipe for success. Decisive factors are knowledge, expertise and a stimulating environment' Lucy Wenting, director of the IIS

Broad-based research in the natural sciences in Amsterdam

FACULTY OF SCIENCE

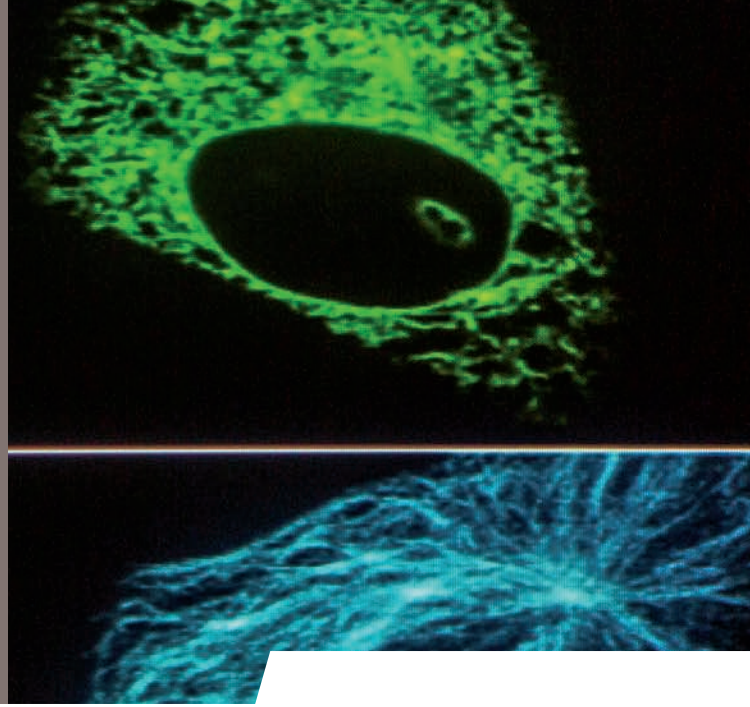
FIGURES

Publications	1,428
Doctorate conferrals	104

Scientific staff

	FTEs
Total	**864**
Male	630
Female	234
Professors	84
Associate professors	70
Assistant professors	95
Postdocs	165
Lectures and PhD candidates	451
Non-Dutch employees	394

The Faculty of Science comprises eight research institutes, each of which has a dedicated field of work. Together they cover a broad field within the natural sciences.



The University of Amsterdam has designated 14 research priority areas in total. Research conducted within these priority areas highlights the best the UvA has to offer and enjoy international acclaim. Research institutes at the Faculty of Science participate in five of these priority areas: Systems Biology, Gravitation and Astroparticle Physics, Brain and Cognition, Quantum Matter and Quantum Information, and Sustainable Chemistry. The Faculty itself has designated another four faculty research priority areas in Global Ecology, Green Life Sciences, Informatics for a Data-rich World and Soft Matter.

5 Veni grants, 9 Vidi grants and 1 Vici grant

Physicist Dr Peter Schall was awarded a Vici grant of €1.5 million by the Netherlands Organisation for Scientific Research (NWO) in January. Another nine researchers from the Faculty of Science received Vidi grants in May. Each of these researchers will receive up to €800,000 for developing an innovative line of research and establishing their own research group. In July, an additional five Veni grants were awarded to researchers from the Faculty who recently obtained their doctorate degrees. These grants amount to a maximum of €250,000 each.

Sustainable Chemistry

A celebratory kick-off was held on 3 September 2014 for UvA's new research priority area Sustainable Chemistry, featuring a symposium and an inaugural lecture by Prof. Bob van der Zwaan. The total research power of the Sustainable Chemistry team area adds up to a full-time equivalent of 90 researchers at the Van 't Hoff Institute for Molecular Sciences. An Industrial Advisory Board assists in the valorisation of Sustainable Chemistry research.

Green Life Sciences

Green Life Sciences is one of four research clusters identified by the Faculty of Science. This research cluster aims to understand the impact of global changes in temperature, rainfall, soil fertility and air quality, and to establish in molecular detail how plants react to environmental changes. These insights will pave the way for sustainable solutions to conserve the earth's biodiversity and for innovations enabling sustainable food production. The cluster was established by two major research institutes from the Faculty of Science: the Swammerdam Institute for Life Sciences (SILS) and the Institute for Biodiversity and Ecosystem Dynamics (IBED). Their joint expertise in Green Life Sciences is combined with the know-how of partners from both academia and the plant-breeding industry.

Anton Pannekoek Institute for Astronomy

API

FIGURES

Publications	234
Doctorate conferrals	8

Staff

	FTEs
Professors	3
Associate professors	7
Assistant professors	2
Postdocs	12
PhD candidates	27
Support and management staff	9

The average in 2014 was 52 scientific staff FTEs, but at the end of 2014 this number increased to 67 FTEs, mostly filled by new PhD candidates.

To apply the laws of physics in order to gain an understanding of the universe and the objects within it, focusing in particular on black holes and neutron stars, gamma radiation, the evolution of stars, planet formation and observation techniques.

New Supernova in M82 observed from Anton Pannekoek Observatory; photographed on 24 January with the 50 cm telescope by student Stephen Skocpol.

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HIGH-LIGHTS

Astronomers discover cause of small magnetar bursts

A team of astronomers, including Dr Anna Watts and Daniela Huppenkothen, has discovered evidence of starquakes on a magnetar using NASA's Fermi Gamma-ray Space Telescope and a new method for analysing the gamma ray and X-ray emissions. Their results were presented at an international conference in Japan.

Gravitational laboratory discovers pulsar in a unique triple star system

Astronomers have discovered a millisecond pulsar orbited by two white dwarf stars. Pulsars are rapidly spinning neutron stars and can serve as astronomical precision clocks. This is the first triple star system found that contains a pulsar. At first, it was a complete mystery as to how this type of system could have formed, but astrophysicists Prof. Ed van den Heuvel and Prof. Thomas Tauris succeeded in developing a model that explains the formation of this unique system in a consistent manner.

Planetoid named in honour of astronomer Huib Henrichs

The International Astronomical Union (IAU) has named a planetoid after Emeritus Professor Hubertus (Huib) Henrichs. This was announced during his farewell lecture on Tuesday, 16 September.

Anton Pannekoek Observatory draws crowds

Free monthly star-gazing evenings, guided tours during the 'Weekend of Science' and visits from students, staff and secondary-school children drew over 1,500 people to the Anton Pannekoek Observatory in 2014 to star-gaze and explore the universe. Local TV station AT5 also broadcasted an episode about the observatory.

'All that shines must be noted.'

Prof. Ralph Wijers, director of the API

IN BRIEF

Science news

- Smallest acceleration of pulsar caused by billions of vortices.
- Gamma ray bursts challenge particle acceleration in jets.
- Herschel space telescope discovers explanation for meteorite mystery.
- Arecibo radio telescope second to detect mysterious radio burst.

Grants and prizes awarded

- NWO multimillion euro grant for Square Kilometre Array (SKA) radio telescope.
- Dr Nanda Rea awarded the Russian Zeldovich Medal.
- ERC Starting Grant awarded to Dr Anna Watts.
- TOP C-1 Grant for Dr Rudy Wijnands.
- Vidi grant for Dr Chris Ormel.
- Veni grant for Dr Adam Ingram.
- NWO Astroparticle Physics grants for Dr Sera Markoff and Dr David Berge.
- Dr Sera Markoff appointed Fellow of the American Physical Society.

Appointments

- Prof. Carsten Dominik has been appointed professor of Astronomy.
- MacGillavry Fellow Dr Selma de Mink assumed post in October.

Van ’t Hoff Institute for Molecular Sciences

HIMS

FIGURES

Publications	149
Doctorate conferrals	20

Staff

	FTEs
Professors	13
Associate professors	7
Assistant professors	9
Postdocs	20
PhD candidates	52
Support and management staff	23

The institute performs internationally recognised fundamental and applied chemistry research within four key themes: Computational Chemistry, Analytical Chemistry, Sustainable Chemistry and Molecular Photonics.

Pupils during the National Chemistry Olympiad 2014. HIMS hosted this annual event from 30 May to 6 June 2014.

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HIGH-LIGHTS

A more effective sunscreen: just add water

Researchers from the Molecular Photonics group have established that a common protective ingredient in sunscreens, the octyl methoxycinnamate (OMC) molecule, reacts differently to UV radiation than previously assumed. This reduces efficacy and can induce harmful side effects. The chemists also found that adding some water can solve the issue, ultimately leading to a more effective sunscreen.

Molecular topology

Modeling stochastic molecular networks such as polymers is quite a challenge since they are complex, flowing and changing systems. While a classical molecular dynamics approach works fine for simple networks with a repetitive pattern, it often collapses with stochastic networks because of the inability of modelling in a reasonable time. Dr Ivan Kryven obtained his PhD *cum laude* for developing a mathematical toolbox for the study of evolving molecular networks expanding on any spatial or time scale.

Bioplastic furniture

Prof. Gadi Rothenberg and colleagues from the UvA and Amsterdam University of Applied Sciences (AUAS) offered the Executive Board the very first table made of biodegradable plastic. Discovered by chance during trials to develop biofuel, the new thermoset plastic is made of glycerol and citric acid, and is therefore completely plant-based and biodegradable and, moreover, soluble in water. The spin-off company Plantics B.V. was launched this summer to commercialise the material.

A step closer to rapid tuberculosis diagnosis

Despite ongoing efforts over the last 125 years to develop a simple tool for the rapid diagnosis of tuberculosis, the ideal method has proven elusive. Dr Ngoc A. Dang has discovered novel biomarkers for the diagnosis of tuberculosis, combining gas chromatography-mass spectrometry (GC-MS) and chemometrics. This technique offers considerable advantages for the analysis of complex biological samples, which may enable future diagnosis of tuberculosis with a hand-held device.

'2014 was exciting: welcoming new scientific staff, producing interesting science and the kick-off for UvA's research priority area Sustainable Chemistry!' Prof. Joost Reek, director of the HIMS

IN BRIEF

Kick-off for Sustainable Chemistry

An exploding balloon filled with sustainable hydrogen marked the kick-off for the UvA's research priority area Sustainable Chemistry at 3 September 2014.

Industry Day

Over 30 companies (from small enterprises from Amsterdam to multinationals) joined the first HIMS Industry Day on 31 October 2014.

Grants and prizes awarded

- Prof. Peter Schoenmakers has been awarded the Knox medal for Separation Science.
- Fourteen project proposals with HIMS applicants were granted by EU, NWO (Veni, Rubicon), FOM and Topsector Chemistry.

Appointments

- Prof. Garry Corthals was appointed professor of Supramolecular separations and Dr Michelle Camenzuli started a tenure track on Enhancing analytical separations within the Sectorplan Physics and Chemistry.
- Within the research priority area Sustainable Chemistry Dr Moniek Tromp (Characterisation of first row transition metal catalysts) and Dr Ning Yan (Fuel cell technology) started a tenure track.
- Prof. Bob van der Zwaan was appointed professor by special appointment of Sustainable Energy Technology.
- Prof. Sander Woutersen was appointed professor by special appointment of Molecular Spectroscopy, a chair endowed by the John van Geuns Fonds.
- Prof. Fred Brouwer was appointed part-time group leader Nanophotochemistry at the Advanced Research Center for Nanolithography (ARCNL).

Institute for Biodiversity and Ecosystem Dynamics

Increasing 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?

How do organisms interact with each other: a bug and a mite on a tomato plant.

IBED

FIGURES

Publications	236
Doctorate conferrals	12

Staff

	FTEs
Professors	10
Associate professors	10
Assistant professors	18
Postdocs	18
PhD candidates	35
Support and management staff	27

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HIGH-LIGHTS

Research on extinct dodo

The only known complete dodo skeleton of a single individual bird has given researchers new insights into the evolution of the extinct dodo. Dr Kenneth Rijsdijk and his colleagues used 3D laser surface scans to understand how the flightless dodo may have evolved its giant size, and how it walked and lived in its forest home. Previously, researcher Ria Winters found evidence that one of the last living dodos survived a long voyage by ship from Mauritius to Japan in 1647, disproving the long-held assumption that dodos were unable to survive long periods at sea.

Chemical analyses of wastewater for research on inhabitants

Prof. Pim de Voogt contributed to a number of studies on the chemical composition of wastewater. One sought to establish the illicit drug use of inhabitants of 42 European cities. In another, it was revealed that two-thirds of the Viagra consumed in the Netherlands may be illegal. This has led researchers to call for further inquiry into the apparent success of rogue online pharmacies.

Research on the environmental risks of shale gas production

Prof. Pim de Voogt and Dr John Parsons are to lead part of a new national Shale Gas and Water research programme investigating the environmental risks to the water system associated with the production of shale gas in the Netherlands, ways of eliminating these risks, and the operation of national and international legal frameworks.

‘On our human-dominated planet nature is a treasure beyond any price ’

Prof. Peter de Ruiter, director of the IBED

IN BRIEF

Science news

- Self-organisation makes mussel beds robust.
- Ermine moths singular in plant choice.
- Mites and insects hijack bacterial gene to prevent cyanide poisoning.
- Frost weathering of volcanic glass can increase health hazards.
- Weather conditions determined migration speed of raptors.
- Rising CO2 levels will intensify algal blooms across the globe.
- Africa’s great apes threatened by growth of oil palm plantations.
- Romans behind massive deforestation of the Dutch landscape.
- Future of emperor penguins on thin ice due to climate change.

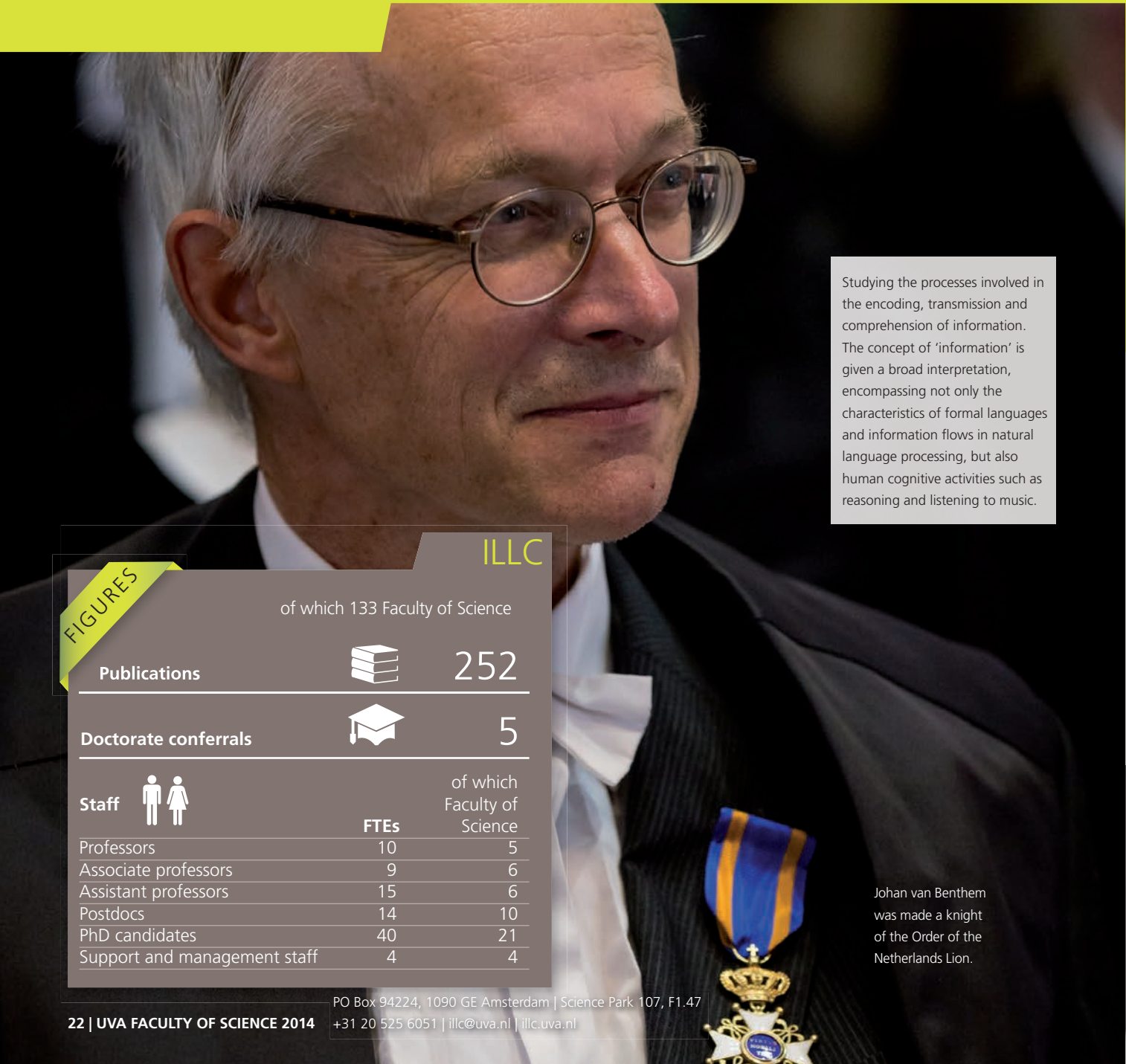
Grants and prizes awarded

- Prof. Hal Caswell received the 2014 Mindel C. Sheps Award for mathematical demography.
- Dr Isabel Smallegange and Dr Merijn Kant were awarded Vidi grants.
- 2014 Jongmans Medal awarded to palynologist Dr Bas van Geel.
- Dr Estela Nadal-Romero was awarded an FP7 Marie Curie People Fellowship for her new interdisciplinary research on afforestation management in the Mediterranean.
- Henry Hooghiemstra was awarded the 2013 Van Waterschoot van der Gracht medal (the highest Dutch distinction for earth scientists) at his farewell ceremony.

Appointments

- Prof. Peter de Ruiter was appointed professor of Soil Ecology and as the new director of the IBED in October 2014.
- Prof. Serge Wich was appointed professor by special appointment of Conservation of the Great Apes.
- Prof. Pim de Voogt was appointed professor of Chemico-Biological Interactions in Aquatic Ecosystems.
- Prof. Henry Hooghiemstra retired

Institute for Logic, Language and Computation



Studying 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

	of which 133 Faculty of Science
Publications	252
Doctorate conferrals	5

Staff	**FTEs**	of which Faculty of Science
Professors	10	5
Associate professors	9	6
Assistant professors	15	6
Postdocs	14	10
PhD candidates	40	21
Support and management staff	4	4

Johan van Benthem was made a knight of the Order of the Netherlands Lion.

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HIGH-LIGHTS

Hooked on Music

Together with his colleagues, researcher Dr Ashley Burgoyne designed an online experiment in the form of an interactive game, Hooked on Music, to determine which hit was recognised the fastest. It identified the Spice Girls' 1996 song *Wannabe* as the catchiest song ever, generating a lot of attention from the international press, including BBC News and CNN. Ashley was awarded an Amsterdam Brain & Cognitive Talent grant for a follow-up project to develop a therapeutic tool for people with memory disorders.

Excellent accreditation result for the Master's in Logic

The Master's in Logic was formally accredited 'excellent' by the NVAO for the 2014-2020 period. It is the first Master's programme at the UvA to receive this rare distinction.

Henkjan Honing gives online lectures for the Universiteit van Nederland

Every day for a whole week in December, Prof. Henkjan Honing gave free online lectures on music cognition that were posted on the website of the Universiteit van Nederland for a broad audience to view.

Johan van Benthem receives royal distinction

Upon his retirement as university professor of Pure and Applied Logic, Van Benthem was made a knight of the Order of the Netherlands Lion on 26 September, in recognition of his myriad research accomplishments and the leading role he has played in the academic community.

IN BRIEF

Grants and prizes awarded

- Dr Khalil Sima'an was awarded an EU Horizon 2020 grant for his Cracking the Language Barrier project.
- MSc Logic graduate Ciyang Qing received the Unilever Research Prize 2014.
- Dr Asheley Burgoyne was awarded a Talent grant from ABC for his Hooked! and item-response models project.

Appointment

- Khalil Sima'an was appointed professor of Computational Linguistics.
- Jos Baeten was appointed professor of Theory of Computing.
- Fenrong Llu was named professor by special appointment to the Amsterdam-China Logic Chair, endowed by the Amsterdam University Fund, to focus on the logical study of information-driven agency.

'Understanding what information is and does requires an interdisciplinary approach'

Prof. Yde Venema, director of the ILLC

Institute of Physics

With almost all research activities grouped within the GRAPPA, Quantum Matter & Quantum Information and Soft Matter research priority areas, the Institute of Physics covers a broad spectrum of both experimental and theoretical topics ranging from particle physics to soft matter.

Participants in the five-day Astroparticle Physics 2014 conference at the Tuschinski Theatre, organised by IoP/GRAPPA from 23 to 28 June.

IoP

FIGURES

Publications	185
Doctorate conferrals	20

Staff

	FTEs
Professors	18
Associate professors	14
Assistant professors	11
Postdocs	34
PhD candidates	84
Support and management staff	9

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HIGH-LIGHTS

Multimillion euro grants secure Nikhef contribution to LHC

In the year in which CERN celebrated its 60th anniversary with festivities hosted by the UvA, several national grants helped secure future Dutch contributions to ongoing experiments at the LHC. NWO awarded a 15.2 million euro grant to Nikhef under the National Roadmap for Large-Scale Research Facilities for an upgrade of its three experiments at CERN's Large Hadron Collider. In addition, FOM extended funding for its strategic LHC research programme, and funded the new theoretical Higgs Physics programme led by Prof. Eric Laenen. UvA physicists played an important role in the ATLAS experiment at the LHC, which discovered the Higgs boson in 2012.

Ancient Egyptians transported heavy stones over wetted sand

Researchers in the Soft Matter group have discovered the physical background of a clever trick used by the ancient Egyptians to make it easier to transport heavy stones by sledge, allowing them to halve the number of workers needed. Their experiments demonstrated that the correct amount of dampness in the sand halves the pulling force required. Their article in Physical Review Letters attracted an huge amount of international media attention.

Both public symposium and international workshop successful

IoP scientists organised several successful events at wonderful locations in Amsterdam. A workshop on Crystallization in Porous Media (CRYSPOM) was held at the Oostindisch Huis in collaboration with the Rijksmuseum to bring researchers in the exact sciences and conservation scientists together. The public symposium on the History and Future of Dark Matter, held on Sunday 22 June at the Koepelkerk with an impressive line-up of speakers, was a wonderful prelude to the international Astroparticle Physics conference that attracted over 300 scientists from across the world to the Tuschinski Theatre.

'With 1 ERC, 1 Vici, 3 Vidi and 2 Veni grants as well as several other major grants in 2014, IoP has once again proven itself to be exceptionally competitive' Prof. Daniel Bonn, director of the IoP

IN BRIEF

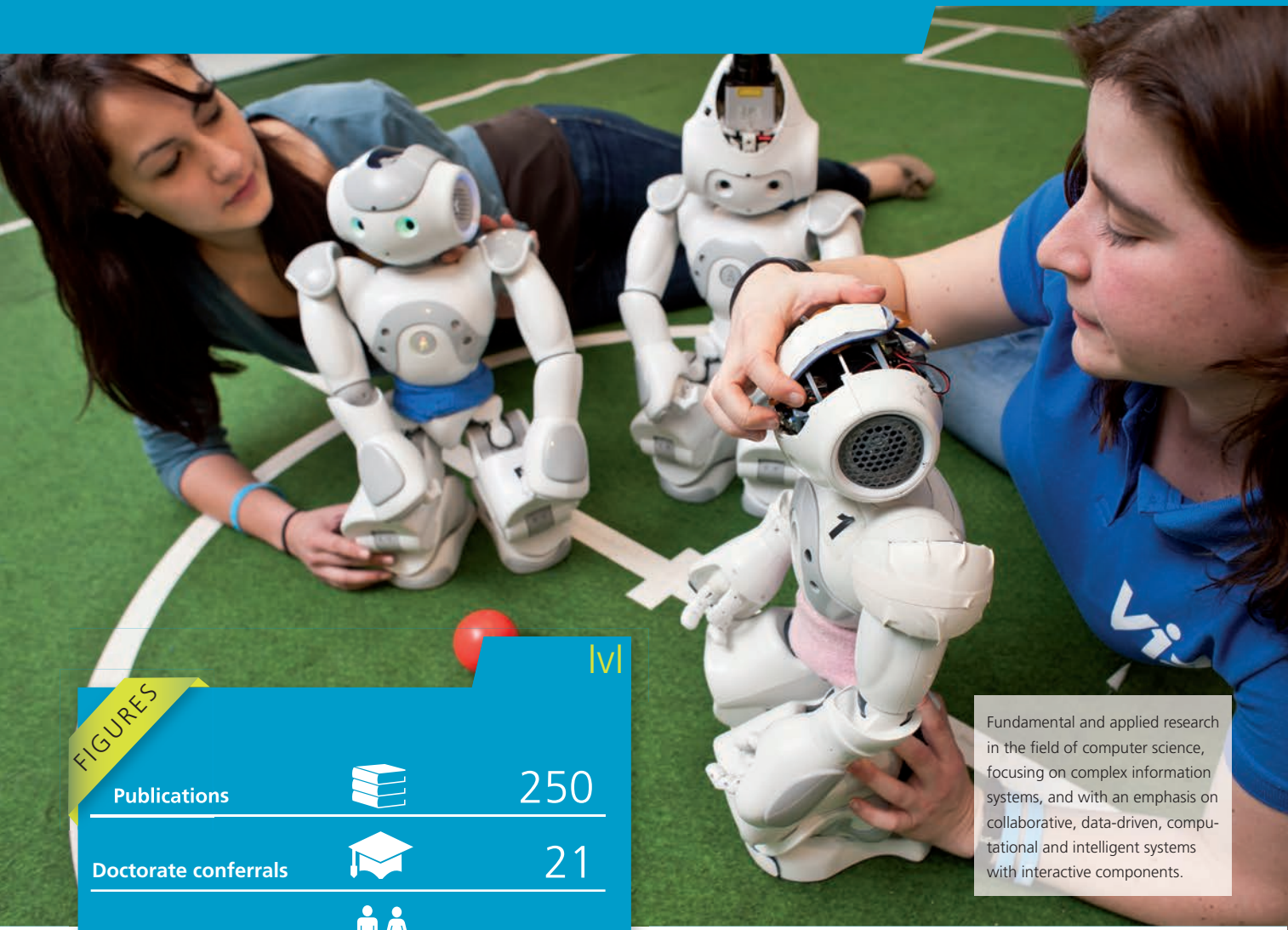
Grants and prizes awarded

- NWO Vici grant for Dr Peter Schall.
- ERC Starting Grant awarded to Dr Miranda Cheng.
- Multimillion euro NWO grant for large-scale research facilities for upgrades to the LHC detector at CERN.
- Three NWO Vidi grants for Dr Alejandra Castro, Dr Christoph Weniger and Dr Jasper van Wezel.
- FOM Vrije Programma grants for Prof. Eric Laenen as well as for Dr Jan Pieter van der Schaar and Dr Ben Freivogel.
- Three FOM Projectruimte grants for Dr Diego Hofman, Prof. Jean-Sébastien Caux and Dr Ben Freivogel.
- NWO ECHO grant for Prof. Daniel Bonn.
- Two NWO Veni grants for Dr Benjamin Pasquiou and Dr Fabio Zandanel.
- Horizon 2020 grant awarded to the Quantum Simulation project, in which Dr Robert Spreeuw is one of the contributing specialists.
- FOM/Shell Computational Science grant for Prof. Daniel Bonn and Dr Rudolf Sprik.
- Prof. Albert Polman awarded the 2014 Physica Prize and the MRS Innovation in Materials Characterization Award.

Appointments

- Prof. Wim Beenakker: professor by special appointment of Experimental High-Energy Physics.
- Prof. Paul Planken: professor of Nanophotonics.
- Dr Miranda Cheng: tenure track in String Theory (with KdVI); MacGillavry laureate.
- Dr Jasper van Wezel: assistant professor in Theoretical Condensed Matter Physics (Vidi laureate).
- Prof. Stan Bentvelsen: new director of Nikhef.
- Royal decoration for Prof. Anne Kox: Officer in the Order of Orange-Nassau.

Informatics Institute



IvI

FIGURES

Publications	250
Doctorate conferrals	21

Staff	**FTEs**
Professors	9
Associate professors	8
Assistant professors	11
Postdocs	28
PhD candidates	67
Lecturers	17
Support and management staff	23

Fundamental and applied research in the field of computer science, focusing on complex information systems, and with an emphasis on collaborative, data-driven, computational and intelligent systems with interactive components.

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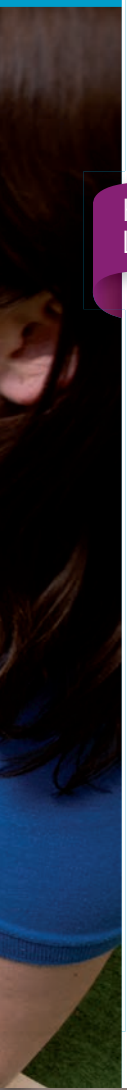

HIGH-LIGHTS

Computer scientists participate in national COMMIT/ event

COMMIT/ is a national ICT research programme comprised of 80 Dutch partners (in universities and business) established to tackle ICT and Big Data challenges at the global level. At the visual demo market held as part of The Big Future of Data event in October, 50 demos were presented dealing with ICT challenges in healthcare, culture, nutrition, safety, climate and social media. COMMIT/ programme members Prof. Maarten de Rijke, Dr Cees Snoek, Marc Makkes MSc and Prof. Theo Gevers took part to present their golden demo at the demo market.

UvA Euvision spin-off acquired by Qualcomm

UvA spin-off Euvision Technologies BV was taken over by Qualcomm, an international market leader in next-generation mobile chips. Euvision is a search engine supplier and was founded five years ago by a team headed by Prof. Arnold Smeulders and Dr Cees Snoek to introduce scientific ideas to the market. With Euvision's acquisition by Qualcomm, which operates worldwide, this scientific knowledge will be disseminated even more widely.

Faster self-learning search engine thanks to new method

Prof. Maarten de Rijke has headed the development of a new method for quickly comparing large numbers of search algorithms that generate search results in search engines like Google, by examining the results users click on. The search engine learns quickly and continuously from user input, enabling it to determine which algorithms produce the best results. This study is part of the LiMoSINe Project (EU/FP7), supported by the NWO.

'Informatics embraces data science as a major new direction and opportunity'

Prof. Jan Bergstra, director of the IvI

IN BRIEF

Science news

- International researchers, including Prof. Peter Sloot, develop a new model that predicts earthquakes on short term.
- The Pirate Bay blockade has been overruled based on UvA research.
- Group led by Prof. Theo Gevers develops software that reveals consanguinity in people's smiles, testing how well visitors to the Frans Hals Museum in Haarlem can imagine the emotions of individuals in paintings.
- Amsterdam video search engine tested as the best in the world by U.S. NIST.
- Dr Christof Monz leads research into a new method to improve Google Translate output.

Grants and prizes awarded

- Multimillion euro grant from NWO for large-scale research facilities for CLARIAH, in which Prof. Maarten de Rijke and Dr Cees Snoek are partners.
- NWO Vidi grants and ERC Starting Grants for Dr Shimon Whiteson and Dr Joris Mooij.
- Three NWO grants for Prof. Max Welling for Big Bang, Big Data, Innovative ICT research and Natural Artificial Intelligence.
- NWO grant for Prof. Cees de Laat and Prof. Rob Meijer for Internet Security (SARNET).
- Horizon 2020 grants for Dr Yuri Demchenko and Dr Zhiming Zhao.
- ACM Multimedia best paper award for Amirhossein Habibian.

Appointments

- Alfons Hoekstra has been appointed professor of Computational Biomedicine at the ITMO.
- Sander Klous has been appointed professor of Big Data Ecosystems.
- Theo Gevers has been appointed professor of Computer Vision.
- Marcel Worring appointed full professor at the Amsterdam Business School.

Korteweg-de Vries Institute for Mathematics

KdVI

FIGURES

Publications	72
Doctorate conferrals	6

Staff

	FTEs
Professors	10
Associate professors	7
Assistant professors	7
Postdocs	7
PhD candidates	21
Lecturers	3
Support and management staff	3

The 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.

The NETWORKS project spans digital, traffic, transport and energy networks.

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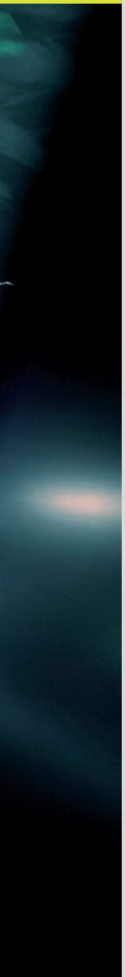


NETWORKS and Logistics

At the end of 2013 a €22.7 million Gravitation Programme grant was awarded to the NETWORKS project, led by Prof. Michel Mandjes. Large-scale networks – including both digital networks and traffic, transport and energy networks – take centre stage in the NETWORKS project, which focuses on modelling, understanding, managing and optimising complex and highly volatile networks. The programme truly got underway in 2014, with the scientific launch of NETWORKS celebrated in June in an event at De Bazel, and three PhD students, two postdocs and one assistant professor hired over the course of 2014.
Related to NETWORKS is the research of Prof. Sindo Nunez Queija and Dr Neil Walton, who received a NWO Sustainable Logistics grant.
NETWORKS is being carried out by a consortium consisting of the University of Twente, the CWI national research institute for mathematics and computer science in the Netherlands, VU, the UvA and Eindhoven University of Technology and addresses the main challenges of the efficient use of available infrastructure in a time of growing urbanisation.

ERC Starting Grant awarded to Miranda Cheng

Dr Miranda Cheng of the Institute of Physics (IoP) and the Korteweg-de Vries Institute has been awarded €1,440,000 for her proposal: Moonshine and String Theory. In her ERC project, Miranda Cheng will investigate the mysterious relation between physical aspects of string theory and some of the largest discrete symmetries in mathematics. This fascinating relationship, called 'umbral moonshine', was discovered several years ago by her and is widely regarded as one of the most important breakthroughs in string theory. The goal of her ERC project is to find a mathematical proof for this relationship and to use this to advance understanding of the underlying symmetries of string theory.

New book by Jan van de Craats: 'Een passie voor symmetrie'

Symmetry and symmetrical patterns can be found in dishes, mugs, cups and saucers, tables and chairs, carpets, curtains and wallpaper patterns, in tile floors, and even in brand signs and hubcaps. In this book Prof. Jan van de Craats considers symmetry from a mathematical perspective.

Prize for Pavel Zorin-Kranich

Dr Pavel Zorin-Kranich has won the Stieltjes PhD Prize for his thesis on 'Ergodic theorems for polynomials in nilpotent groups'. The Stieltjes Prize is an annual prize conferred by WONDER, a Dutch research school, for the best PhD thesis in mathematics.

'A year of consolidation and growth'

Prof. Jan Wiegerinck, director of the KdVI

IN BRIEF

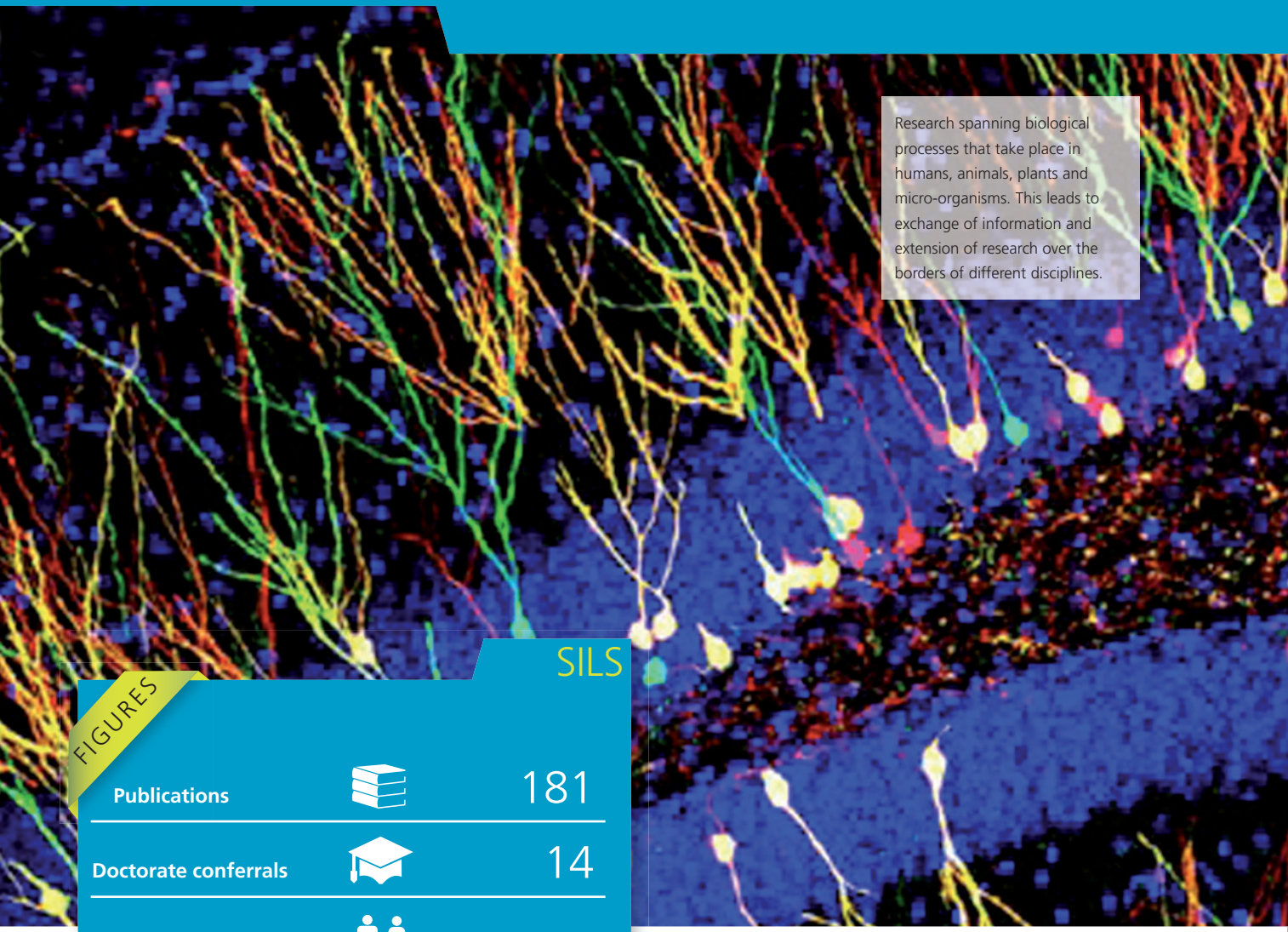
Grants and prizes awarded

- ERC Starting Grant awarded to Dr Miranda Cheng.
- NWO Sustainable Logistics grant for Prof. Sindo Nunez Queija and Dr Neil Walton.
- NWO grant for Prof. Daan Crommelin, Prof. Harry van Zanten and Prof. Michel Mandjes for the programme Mathematics of Planet Earth.

Appointments

- Daan Crommelin has been named professor by special appointment of Numerical Analysis and Dynamical Systems.
- Jasper Stokman has been appointed professor of Lie Theory.
- Jan van Mill has been appointed professor of Topology.
- Lenny Taelman has been appointed professor of Algebraic Geometry.
- Royal decoration for Prof. Jan van de Craats: Officer in the Order of Orange-Nassau.

Swammerdam Institute for Life Sciences



Research spanning biological processes that take place in humans, animals, plants and micro-organisms. This leads to exchange of information and extension of research over the borders of different disciplines.

SILS FIGURES

Publications	181
Doctorate conferrals	14

Staff

	FTEs
Professors	15
Associate professors	10
Assistant professors	31
Postdocs	31
PhD candidates	94
Lecturer	1
Support and management staff	53

Neurogenesis in the adult brain: new-born nerve cells are recognisable as white cell bodies with coloured dendrites. Neurogenesis is affected by factors such as stress and brain diseases as well by movement and nutrition in early life (Korosi et al., BBr 2012; Lucassen et al., tins 2013). Dr Aniko Korosi received the NWO Food & Cognition grant in collaboration with Danone research to study the effects of early nutrition on brain development.

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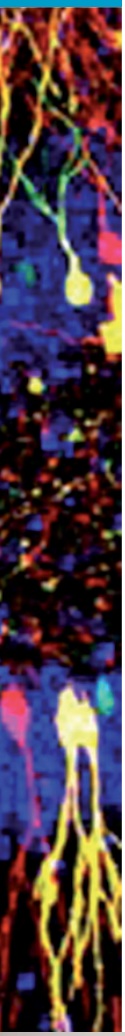
HIGH-LIGHTS



Broadening the research spectrum with a study on flower colour

With the appointment of Prof. Ronald Koes, affiliated with VU since 1983, the Swammerdam Institute for Life Sciences (SILS) has broadened its spectrum of research activities. His group conducts research into the genetic networks that control the development of plants. Koes wants to gain more insight into the way in which genes control the development of a small group of undifferentiated cells into complex organisms consisting of many different cells. His research focuses in particular on the flowers of higher plants. The initiation and development of flowers is key to the production of fruits and seeds, and thus plant reproduction, the yields of fruit and seed crops and the beauty of ornamental plants. Flowers also serve as an effective model for the study of fundamental biological processes.

Stem cell research at SILS gets a boost

Dr Renée van Amerongen was awarded a Vidi grant to study stem cells in normal development and in breast cancer. Development of a multicellular organism requires tight control of cell proliferation, differentiation and cell movements to ensure the correct assembly of cells into complex tissues. When disrupted, they are the cause of degenerative diseases, tumour formation and, ultimately, ageing. Focusing on the mammary gland, Van Amerongen's group operates at the exciting interface of regenerative medicine and fundamental cancer research.

Netherlands Forensic Institute and UvA partner in research

Prof. Ate Kloosterman (NFI) and Dr Pernette J. Verschure (UvA) received research funding from the Ministry of Security and Justice to study epigenetic changes of the DNA for forensic applications. Over the next two years, the organisations will be partnering in a research project aimed at determining the age of unidentified bodies and perpetrators on the basis of the epigenetic composition of DNA.

Next-generation sequencer: IonProton

'Our research was assessed as very good to excellent and very relevant for society'

Prof. Willem Stiekema, director of the SILS

IN BRIEF

Science news

- New theory that some cancer cells escape from our anticancer drugs by switching from a state of proliferation to one of metastasis.
- Plants use flexible root branching strategies to cope with salinity stress.
- Role of the hippocampus in memory and epilepsies unravelled and the influence of environmental factors on the development of the brain mapped.
- Discovery that the 73-year old 'gene for gene' theory, a facet of plant disease resistance, is an oversimplification of reality.

Grants and prizes awarded

- Vidi grant for Dr Renée van Amerongen.
- Veni grant for Dr Silke Allman.
- ECHO grant for Dr Christa Testerink.
- ALW grant for Prof. Cyriel Pennartz.
- Marie ITN EC MC grant from Horizon 2020 for Dr Pernette Verschure .
- NWO Top Consortium for Knowledge & Innovation grant for Dr Harrold van den Burg and Prof. Marcel Prins.
- Netherlands Food and Consumer Product Safety Authority grant for Prof. Stanley Brul's group.
- Young Heineken Prize 2014 for Dr Martin Vinck.
- Giulia De Luca MSc received the Amsterdam Science & Innovation Award 2014.

Appointments

- Prof. Ronald Koes appointed as professor of Developmental Genetics.
- Dr K. Jalink of the Netherlands Cancer Institute appointed as special chair Advanced Microscopy.
- Prof. Hans Westerhoff was appointed Fellow of the International Society for Systems Biology.

Joint Forces

ARCNL opening ceremony. Left to right: Joost Frenken (ARCNL), Sander Dekker (State Secretary), Rob van Hattum (host), Martin van den Brink (ASML).

At the Faculty of Science, 2014 was a year marked by fruitful collaboration with partners such as chip manufacturers ASML and Qualcomm. Work began on the interior of the O|2 building, where UvA and VU researchers will be working together within the field of Human Life Sciences. The 'Cybersoek' outreach project was launched in partnership with an Amsterdam neighbourhood.

Business partnerships

The Faculty of Science launched unique collaborations with two large companies. An agreement with chip manufacturer ASML, the Foundation for Fundamental Research on Matter (FOM) and VU led to the opening of the Advanced Research Center for Nanolithography (ARCNL). Qualcomm, the market leader in mobile chips, acquired UvA spin-off Euvision Technologies BV, which produces software. The Faculty also established fruitful ties with various smaller companies such as 904Labs and TWC. These partnerships also feed into the Faculty's aim to make as much knowledge available to society as possible.

Large research projects

Horizon 2020, a European programme designed to stimulate research and innovation, began awarding funding in 2014. Faculty efforts to prepare staff for this programme over the past few years paid off, with researchers securing participation in five collaboration projects in the first calls. The Faculty of Science is coordinating two of these projects: EpiPredict, which is conducting research into breast cancer, and SWITCH, which is looking into cloud-computing applications. In 2014, Dr Shimon Whiteson of the Informatics Institute (IvI), Dr Anna Watts of the Anton Pannekoek Institute (API) and Dr Miranda Cheng of the Institute of Physics (IoP) and Korteweg-de Vries Institute for Mathematics (KdvI) each received an ERC grant. Researchers at the Faculty of Science also submitted a large number of proposals for collaborative projects and individual grants. A total of 147 applications were submitted.

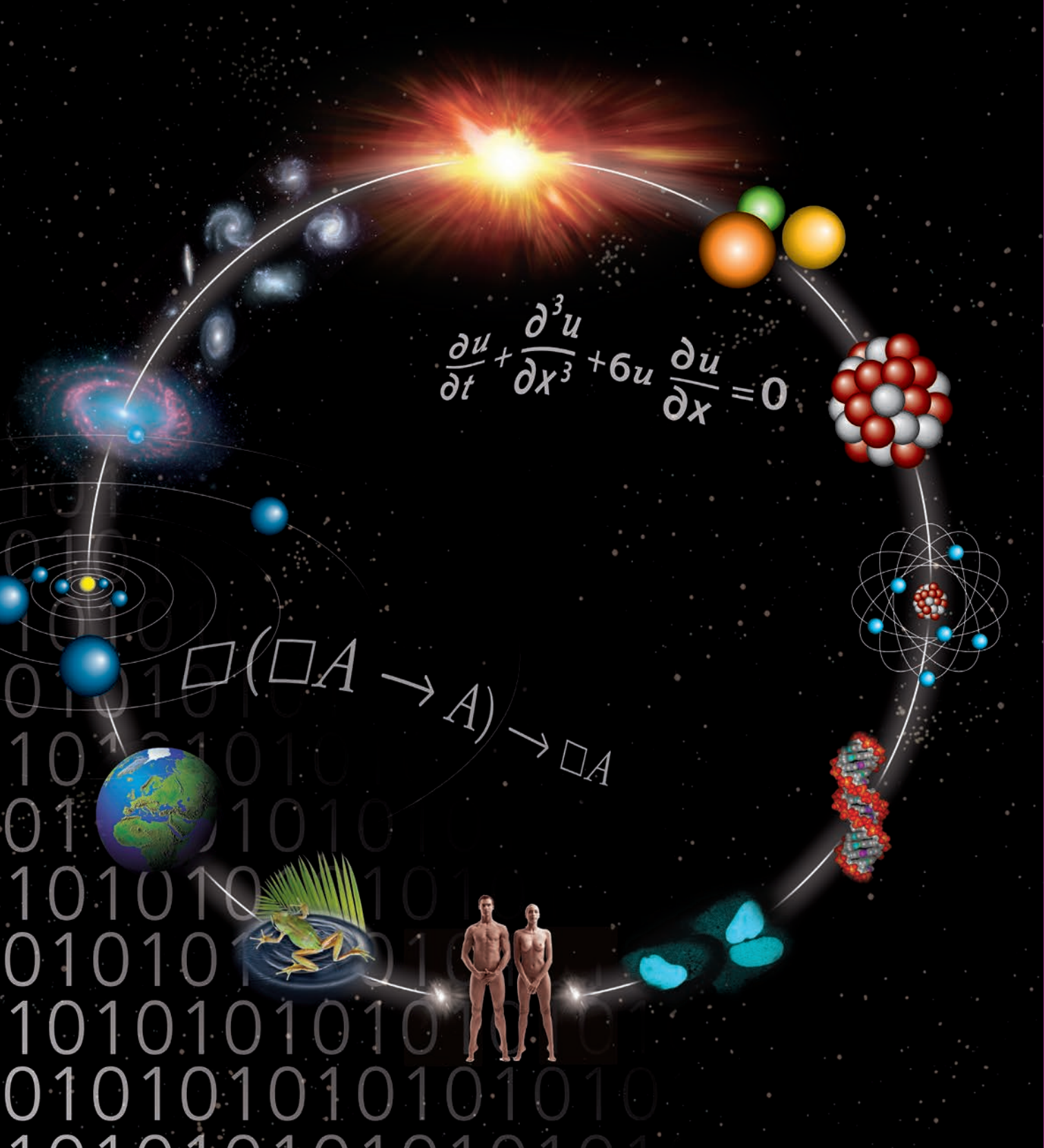
Collaboration with VU science faculties

In 2014, the collaboration between the UvA Faculty of Science and the VU Faculties of Sciences and Earth & Life Sciences took more definite shape. Core teams worked on a multi-year plan for education and research for the different virtual departments (the pooling of related groups at the UvA and VU). Exploratory committees also analysed how to best implement collaboration in teaching. The Accommodation Programme also continued its efforts to concentrate the 'Fundamentals of Science' and 'Science for Sustainability' domains at Science Park and the 'Information Sciences' and 'Human Life Sciences' domains at the Zuidas location.

Outreach

Outreach is an important priority at the Faculty of Science. It gives a chance to show what kind of research it is conducting, in the hopes of strengthening the connection between secondary education and higher education. Thanks to the Bètapartners network, the Faculty was able to throw a wide net. It organised practical training classes at the Faculty, guest lectures at schools and masterclasses for talented pupils. 2014 also saw the start of the Cybersoek project in Amsterdam's Indische Buurt neighbourhood. In cooperation with a community centre and three primary schools, faculty staff organised weekly science workshops for pupils, thereby strengthening ties with the neighbourhood.

Pupils on a excursion to the observatory domes as part of the Cybersoek project.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