



AIMS

African Institute for
Mathematical Sciences
SOUTH AFRICA



Annual Report 2014



about us

contents

The African Institute for Mathematical Sciences (AIMS) is a pan-African network of centres of excellence for postgraduate education, research and outreach in mathematical sciences. Its mission is to enable Africa's brightest students to flourish as independent thinkers, problem solvers and innovators capable of propelling Africa's future scientific, educational and economic self-sufficiency. AIMS was founded in Cape Town, South Africa in 2003. Since then, AIMS centres have opened in Senegal (2011), Ghana (2012) and Cameroon (2013). AIMS Tanzania is expected to open in 2014. The pan-African network of AIMS centres is coordinated by the AIMS Next Einstein Initiative (AIMS-NEI).*

This is the annual report of AIMS South Africa for the period 1 August 2013 to 31 July 2014. It includes an overview of all activities of AIMS South Africa and its associated projects, as well as the financial statements for the 2013 calendar year.

Since AIMS South Africa opened, 528 students from 35 different African countries have graduated from its core academic programme. The alumni include 166 women.

AIMS South Africa offers

- An intensive one-year Structured Master's in Mathematical Sciences with intakes in August and January.
- Specialised courses as part of regular honours and Master's degree programmes at South African universities
- Research and training workshops
- Local association with the Universities of Cape Town, Stellenbosch and Western Cape
- International association with the Universities of Cambridge, Oxford and Paris-Sud XI

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Barry Green, Director

“This year AIMS South Africa passed the 500 graduation mark and we are proud that more than 70 of our alumni have now completed PhDs. In addition over 250 graduates have completed research Master’s degrees, 75 are working in industry; and over 130 are lecturing or teaching.”

FOREWORD BY THE Director

The 2013-14 academic year heralded a new era for AIMS South Africa. We had celebrated our tenth anniversary in June 2013 and our academic programme had become well established and recognised. After struggling to attract South African students, the launch in January 2012 of a second intake of students for the Master’s programme was bearing fruit and proving attractive. By the end of 2014, the number of South African students successfully having enrolled and completed the AIMS Master’s programme will put South Africa in fifth place for African country enrolment for this programme.

AIMS South Africa is now part of a growing network, with fully operational AIMS centres in Sénégal, Ghana and Cameroon, and a new one planned to open in Tanzania in October 2014. The AIMS programme, with strong local and international involvement, has been replicated successfully at these new centres and has demonstrated its robustness and appropriateness as a unique and innovative model for scientific growth and development in Africa. The enthusiasm with which AIMS has been welcomed and supported by African academics, organisations and governments has been a very special and humbling experience. This will without a doubt accelerate the achievement of the AIMS mission, which is to enable Africa’s outstanding mathematical science graduates to flourish as independent thinkers, problem solvers and innovators, capable of propelling Africa’s future educational, scientific and economic self-sufficiency.

This year AIMS South Africa passed the 500 graduation mark and we

are proud that more than 70 of our alumni have now completed PhDs. In addition over 250 graduates have completed research Master’s degrees, 75 are working in industry; and over 130 are lecturing or teaching. At each of our graduation ceremonies special awards for outstanding achievement are given. It is a pleasure to mention that at the November 2013 recognition ceremony for the January intake, Matthews Sejeso (from North West Province) received the Ben and Mary Turok Scholarship - an award established with funds generously donated by Prof. Neil Turok the founder of AIMS.

Together with South Africa and the world we were saddened by the passing of President Nelson Rolihlahla Mandela, Madiba, our first democratically elected president. Staff and students marked the event by reflecting on the life accomplishments and inspirational example of this great man. We are honoured that this iconic statesman was South African and led the birth of our new democracy. Through his amazing example, he gave us all strength and encouragement and a foundation to build on.

The AIMS South Africa Research Centre has established itself as an exciting active environment contributing significantly to its chosen focus areas and promoting the cross-cutting theme of “Mathematics for Development”. Recent appointments include a joint South African Research Chairs Initiative (SARChi) Chair in the mathematical and physical biosciences shared with Stellenbosch University, an African Research, Education and Training Excellence (ARETÉ) Junior Chair generously funded by the Robert

“The enthusiasm with which AIMS has been welcomed and supported by African academics, organisations and governments has been a very special and humbling experience.”



Reflective session on the passing of Nelson Mandela held on 20 December.

Bosch Stiftung (to help AIMS alumni to establish themselves in Africa), and two Junior Chairs funded by the Canadian International Development Research Centre (IDRC) jointly with AIMS South Africa and AIMS Ghana.

Through generous funding by the South African National Skills Fund the AIMS Schools Enrichment Centre (AIMSSEC) has turned a corner. It has received proper recognition for its work and is offering professional development courses to teachers from all over South Africa. A number of appointments have been made and in February 2014 AIMSSEC moved to more spacious premises in Muizenberg.

Sadly, at the close of this academic year AIMS Trustee, Prof. Russel Botman, Rector and Vice-Chancellor of Stellenbosch University (SU), passed away. Russel Botman was a close friend and an outstanding supporter of AIMS. He served both as a trustee of AIMS South Africa and as board member of the pan-African umbrella organisation, the AIMS Next Einstein Initiative (AIMS-NEI). He provided invaluable help and advice

as our centre grew over the years, and both he and SU were enormously supportive of AIMS’ expansion to new centres across Africa.

This year the International Mathematics Olympiad was held in South Africa, hosted by the University of Cape Town. AIMS was proud to be among the many institutions and organisations contributing to the success of this event, which included a record number of participants and countries. Twelve African countries participated and it was a pleasure to host a training camp for these teams at AIMS before the main event.

The staff of AIMS South Africa, the AIMS South Africa Council, the Advisory Board, our partner universities, the Next Einstein Initiative and our supporters all contribute to the success of this institute and it is a pleasure to thank them for their commitment and contribution.

Barry Green, Director



interpolation operator

$$= \sum \left[\frac{1}{6} f\left(\frac{j-1}{2^r}\right) - \frac{1}{6} f\left(\frac{j}{2^r}\right) \right] \phi\left(2^r x - j\right)$$



academic
programmes

Academic Programmes



Jeff Sanders, Academic Director

This year, we have again been fortunate enough to be able to offer exciting and innovative courses. This is due to enthusiastic international and South African interest, combined with the support of a strong team of tutors. The outcome has been another successful year run according to the AIMS model which is designed to graduate independent-thinking students with a broad mathematical foundation and entrepreneurial edge, committed to solving the problems confronting Africa.

Master's in Mathematical Sciences (January 2013 intake)

AIMS attracted eight students into its structured Master's in Mathematical Sciences which commenced in January 2013, seven of them from South Africa (the universities of Limpopo, Venda, Zululand, Witwatersrand and Cape Town) and one from Chad.

All graduated, with three research projects in financial mathematics, four in applied mathematics and one in pure mathematics. Two thirds of the courses were offered by international lecturers on topics spanning computing, statistics, applied mathematics, physics, biomathematics, mathematical finance and entrepreneurship.



“AIMS gives almost guaranteed opportunities and hopes of a successful future to many young scientists across Africa. AIMS allows you to scope a lot of useful concepts about life, your future profession (which is not only academic) and your social life. Your knowledge will be diversified which at the end means you will be able to choose your area of expertise with confidence. It is very challenging and exciting, and there is enough support for everyone to succeed.”

Matthews Sejeso
(January 2013 intake)

Research Projects of the January 2013 intake

Student	Gender	Research Project Title	Supervisors
Michael Benjamin Cromberge	M	Assessing methods to determine date of admixture in a multi-way admixed population	C Gilmour, Cape Town
Masingita Errol Manganyi	M	Modelling transport of air pollutants using the Gaussian plume	MK Banda, Stellenbosch
Enos Mogale Mphahlele	M	Numerical Methods for the Control of Conservation Laws	MK Banda, Stellenbosch
Ndivhuwo Mphephu	M	Numerical Solution of 1-D Convection-Diffusion-Reaction Equation	SN Nguetchue & AR Appadu, Pretoria
Phumlani Mzazi	M	Portfolio Insurance Strategies	R Ghomrasni, AIMS
Qondisa Ngxanga	F	On the Use of Numeraires in Option Pricing	R Ghomrasni, AIMS
Moustapha Abakar Ousman	M	Simulation of asset prices evolution in selected financial mathematics models and integrated volatility estimation	R Marcin, Warsaw School of Economics
Matthews Malebogo Sejeso	M	Algorithms for l1-norm minimization and its applications	M Ali, Witwatersrand



“When I weigh up my time at AIMS, I am most grateful for having learned that the world is smaller than it seems. With all our variety of religions and cultures, we all share similar dreams – to make Africa great. So let us put all the skills we have acquired into transforming the world. Let us go out there and achieve our dreams. AIMS has been an eye opener and a place to be for a young African scientist with dreams about making Africa a better place. It has contributed to boosting my self-confidence and being more of an independent thinker. It is the best place to build your career.”

Ms Rosemary Akinyi Aogo,
Kenya (August 2013 intake)

Master’s in Mathematical Sciences (August 2013 intake)

This year, the Master’s programme commencing in August, attracted more than ten applications per place. Slightly more last-minute (i.e. post-acceptance) withdrawals than usual resulted in a class of 48 spread over 20 nationalities. Unaccountably, the standard of English was higher than in recent years. Lecturers and tutors also reflected a spread of nationalities: two-thirds of the lecturers were international and tutors (eight at any time) came from Cameroon, DR Congo, Ethiopia, Ghana, Madagascar, Morocco, Namibia, Portugal, Rwanda and South Africa.

The Master’s is accredited by Cape Town’s three participating universities, between which students are divided equally for purposes of registration. It is funded by the South African Department of Higher Education and Training (DHET) and consists of three phases. The compulsory *skills courses* set the highly interactive and problem-based style of teaching and focus on upgrading students’ skills in problem-solving and computation while providing an introduction to computer programming, scientific writing in English, statistics and business and entrepreneurial skills.

The elective *review courses* introduce students to cutting-edge topics in mathematical science, and are lectured by international and local experts. The AIMS model facilitates a selection of review courses which accommodates the availability of exceptional lecturers and recent important topics. It incorporates continuing assessment to allow students to focus on the acquisition of research skills. This year, the programme included specialised guest lectures, team entrepreneurial projects evaluated by a panel of experts, and the “Mathematics in Industry Study Group” workshop which provided students with the opportunity for group study of industry-related problems. We were particularly pleased to have offered, for the first time, a course taught by an AIMS graduate Angelina Lutambi: “The Mathematical Epidemiology of Infectious Diseases”.

In the third component of the programme students undertake three-month research projects. Supervision again worked smoothly with solid support from the three Cape Town universities (58%), growing supervisory support from our burgeoning research centre (16%), and international supervisors providing the balance.

All students graduated. The examiners awarded distinctions to more than half the research projects, though after moderation with coursework marks the number of distinctions overall dropped to 31%. The external examiners this year were Dr Alan Cornell (Witwatersrand), Prof. Marcel Wild (Stellenbosch), Assoc. Prof. Christopher Gilmour (Cape Town), Profs Kailash Patidar and Francis Benyah (Western Cape), Prof. Henry Mwambi (KwaZulu-Natal) and Prof. Jean Lubuma (Pretoria).

Study breaks allow students the opportunity to consolidate their studies, and to benefit from attending specialised workshops which this year included financial mathematics, mathematics of industrial problems, mathematical structures, graph theory and the meaningful modelling of medical data. Students attended two Cape Town Google Developer Group workshops on Android mobile application development and non-profits in October 2013, and a mobile application development workshop on the AppShed platform in November.

Throughout the year students went on various outings which included hikes, a trip to the Castle of Good Hope and the South African Museum in Cape Town.

On 6 December 2013, as a tribute to Nelson Mandela’s passing, students and staff observed a minute of silence with all present. Students also prepared messages, lessons and recollections which they presented at a reflective session on 20 December 2013. These were moving tributes to Mandela which reflected the students’ understanding of his life, legacy and the impact he has had on South Africa, Africa and the rest of the world.

Courses offered at AIMS

Period	Lecturer	Course	MSc Jan 2013	MSc Aug 2013	MSc Jan 2014	Hons Biomaths 2014
2013						
26 Aug – 1 Nov	Frances Aron, AIMS	English Essentials and Communication Skills		x		
26 Aug – 1 Nov	Jan Groenewald, AIMS	Computing and LaTeX		x		
2 – 13 Sept	Anthony Scopatz, Wisconsin-Madison	Scientific Computing 1		x		
2 – 13 Sept	Fritz Hahne, Stellenbosch	Concepts in Physics and Physical Problem Solving	x	x		
16 Sept – 4 Oct	David Spiegelhalter, Cambridge	Probability and Statistics	x	x		
23 Sept – 11 Oct	Stephen Hartke, Nebraska Lincoln	Experimental Mathematics in SAGE		x		
7 -18 Oct	Paul Taylor, Cape Town	Scientific Computing 2		x		
14 Oct – 1 Nov	Alan Beardon, Cambridge & Stephan Wagner, Stellenbosch	Mathematical Problem Solving		x		
21 Oct – 1 Nov	Frances Aron, Jan Groenewald & Jeff Sanders, AIMS Arun Sharma, AIMS-NEI	Professional Development and the Scientific Environment	x	x		
11 - 29 Nov	Bernd Schroers, Heriot-Watt	Quantum Computing		x		
	Jacek Banasiak, KwaZulu-Natal	Differential Equations		x		
	Bruce Bartlett & Arnold Keet, Stellenbosch	Group Representations		x		
2 - 20 Dec	Robert de Mello Koch, Witwatersrand	Electromagnetism		x		
	Gabriel Lord & Lyonell Boulton, Heriot-Watt	Numerical Analysis		x		
	Jane Hutton, Warwick	Analysis of Lifetime Data		x		
2014						
6 - 24 Jan	Workshop	Mathematics in Industry Study Group		x		
	Mustapha Amin, Cambridge & Navin Sivanandam, AIMS	Statistical Mechanics		x		
	Tadashi Tokieda, Cambridge	Topology and Geometry		x	x	
	Rob Beezer, Puget-Sound & Nancy Neudauer, Pacific	Designs, Matroids and Graphs		x		
	David Stern, Maseno	Mathematical Problem Solving			x	
	Theis Lange, Copenhagen	Statistics with R			x	
27 Jan – 14 Feb	Steven Bradlow, Illinois	Curves		x		
	Raouf Ghomrasni, AIMS	Financial Mathematics		x	x	
	Marcin Kostur, Silesia	Mathematical Modelling in Biosciences		x	x	x
	Heinrich Schwoerer, Stellenbosch	Laser Physics		x	x	
	Wilson Lamb, Strathclyde	Analytical Techniques in Mathematical Biology		x	x	x
	Jeff Sanders & Evans Ocansey, AIMS	Programming with Python			x	x
24 Feb – 14 Mar	Wolfram Decker & Gerhard Pfister, Kaiserslautern	Computational Algebra		x	x	
	Babette Doeblich, CESY & Michael Scherer, Heidelberg	Quantum Theory in a Nutshell		x	x	
	Aziz Ouhinou, Sultan Moulaye Slimane	Mathematical Modelling in Biology		x	x	x
17 – 21 Mar	Graeme Richards, Oxford	Entrepreneurship		x	x	
17 Mar – 4 Apr	Dan Jacobson, Stellenbosch	Biostatistics		x	x	x
	Angelina Lutambi, Ifakara Health Institute	Epidemiology of Infectious Diseases		x	x	x
	Robert Kowalewski, Victoria & Andrew Hamilton, Cape Town	Particle Physics		x	x	
	Ravi Ramakrishna, Cornell	Algebraic Number Theory		x	x	
14 Apr - 2 May	Michael Grinfeld, Strathclyde	Asymptotic Methods			x	
	Lafras Uys, AIMS	Systems Biology			x	x
5 - 24 May	Juerg Weber, Western Australia & Peter Zweifel, Zurich	Insurance Economics			x	
	Jeff Orchard, Waterloo	Neural Systems			x	x
26 May - 13 June	Jeff Sanders, AIMS	Designing Algorithms			x	
	Mike Neamtu, Vanderbilt & Johan de Villiers, AIMS	Wavelets and Subdivision			x	
	Steve Bellan, Texas	Mathematical Modelling in Medicine and Public Health			x	x

Research Projects of the August 2013 intake

Name	Gender	Origin	Research Project Title	Supervisors
Saga Elsayed Ibrahim Abdalla	F	Sudan	Higgs-Kibble Mechanism and the Standard Model	H Weigel, Stellenbosch
Yahya Ali Abdulkadir	M	Ethiopia	An Efficient Finite Difference Discretization for Time-dependent Multi-dimensional Partial Differential Equations	K Patidar, Western Cape
Sakirudeen Akinkunmi Abdulsalaam	M	Nigeria	Optimal Control Approach to Aircraft Conflict Avoidance	M Ali, Witwatersrand
Simabat Agnes Adefisan	F	Nigeria	Determining an Optimal Stage for Initiating ARV Treatment for HIV/AIDS Patients	F Benyah, Western Cape
Essraa Taha Mirghani Ahmed	F	Sudan	Mapping Interacting Excited States onto a Kohn-Sham System: Analytic Two Particle Systems	D Joubert, Witwatersrand
Abdelhamid Mohamed Adam Ali	M	Sudan	Quantum Corrections to the Kink Soliton Mass	H Weigel, Stellenbosch
Achamyelesh Amare Aligaz	F	Ethiopia	A Novel Pseudo-Spectral Method to Solve Initial and Boundary Value Problems	K Patidar, Western Cape
Rosemary Akinyi Aogo	F	Kenya	Investigating Gene-Environment Interactions in Genome-wide Disease Scoring Statistics	N Mulder & E Chimusa Rugamika, Cape Town
Belthasara Assan	F	Ghana	Stability Analysis of Selected Epidemic Models	F Benyah, Western Cape
Fikreyohans Solomon Assfaw	M	Ethiopia	Interior Versus Closure Operators in Categorical Topology	D Holgate, Western Cape
Jean Juste Harrison Bashingwa	M	Burundi	Invariance of differential equations	A Kara, Witwatersrand
Taboka Prince Chalebqwa	M	Botswana	Critical Points of Complex Polynomials	F Breuer, Stellenbosch
Chilombo Trevor Chimpinde	M	Zambia	A Categorical Approach to the Jordan-Hölder Theorem	Z Janelidze, Stellenbosch
Kenneth Dadedzi	M	Ghana	Distance Matrix of a Graph	S Wagner, Stellenbosch
Horace Pene Akata Eketete	F	DR Congo	Toward an Integrative Resource of Information Content-based Gene Ontology Measures	G Mazandu, Cape Town
Shimaa Yasser Ahmed Hanefy El-Esaely,	F	Egypt	Game Options	R Ghomrasni, AIMS
Ikenna John Kingsley Ezike	M	Nigeria	Pólya's enumeration method	S Wagner, Stellenbosch
Mary Ajibola Familusi	F	Nigeria	Duration of Relationship and HIV Transmission	JL Hutton & W Delva, Warwick
Alzahraa Mohamed Fahmy Hassan Farrag	F	Egypt	Fisher Information	J Murugan, Cape Town & J Shock, Max Planck Institute
Andwilile Abrahamu George	M	Tanzania	Calculus of Variations and Optimal Control in Economic Models	GSF Frederico, Cape Verde
Sosthene Irambona	M	Rwanda	Cosmology and the Boltzmann Equation	N Sivanandam, AIMS
Sarafa Adewale Iyaniwura	M	Nigeria	Optimizing a Protocol for Fluorescent Recovery after Photobleaching Experiments	D Coombs, British Columbia & S Chun, AIMS
Tseliso Paul Lekhoaela	M	Lesotho	The Perfect Numbers	F Breuer, Stellenbosch
Wanele Gcinumuzi Mamba	M	Swaziland	The arbitrage-free Nelson-Siegel model of the yield curve	R Ghomrasni, AIMS
Edna Chilenje Manda	F	Malawi	Within host dynamics for treatment of R5 HIV infection on the Langerhans cells	F Chirove, KwaZulu-Natal
Xavier Mbaale	M	Zambia	Ruler and Compass Construction of Regular Polygons	A Keet, Stellenbosch
Emile Fonki Meoto	M	Cameroon	The Adjoint-State Method Applied to Geophysical Inversion	R Kahle & B Kahle, Cape Town
Thuso Ben Modise	M	Botswana	A Basic Introduction to Machine Learning	B Bassett & N Sivanandam, AIMS
Husam Abubakr Alsididig Abdallah Mohamed	M	Sudan	General Relativity, Cosmology and Inflation	N Sivanandam, AIMS
Nasilele Monde	M	Zambia	Chasing Subgroups	Z Janelidze, Stellenbosch
Audrey Bakongia Moswa	F	DR Congo	Epidemic Modelling for Complex Networks: An Application to the Internet-of-Things (IoT)	A Bagula, Cape Town
Godfrey Edward Mpogolo	M	Tanzania	A Mathematical Model of the Spread of HIV/AIDS Amongst Injecting Drug Users	W Lamb, Strathclyde
Frederic Ntirenganya	M	Rwanda	Analysis of Rainfall Data from Rwanda	R Stern & D Stern, Reading
Evans Otieno Ochiaga	M	Kenya	Species Abundance Distribution	C Hui, AIMS
Amos Otieno Okech	M	Kenya	A robust A-stable collocation method for a class of stiff initial value problems	K Patidar, Western Cape
Leakey Odoyo Omolo	M	Kenya	The Anomalous Electron Magnetic Moment	H Weigel, Stellenbosch
Fanuel Omondi Otieno	M	Kenya	Intimate Partner Violence and Age Disparity: a multi-country analysis	W Delva, SACEMA
Rosephine Georgina Rakotonirainy	F	Madagascar	The imprecise Dirichlet model for predicting consumer behaviour	I Durbach, AIMS
Andriamanankasina Ramanantoanina	M	Madagascar	Multivariable Dilation Theory	R Martin, Cape Town
Dinna Ranirina	F	Madagascar	Incompressibility: revisited	GJF Smit & GPJ Diedericks, Stellenbosch
Tamba William Saa	M	Liberia	Autocorrelation of an ultrashort laser pulse to determine its duration	H Schwoerer, Stellenbosch
Pie Sinangwanabose	M	Rwanda	A Mathematical Model of Pneumococcal Carriage and Transmission	W Lamb, Strathclyde
Ridick Roland Takong	M	Cameroon	Improving the Kain-Fritsch convection scheme in simulating a squall line: sensitivity to convective time scale	JB Abiodun, Cape Town & D Steyn, British Columbia
Ishmael Takyi	M	Ghana	Radiative Corrections Associated with the One-loop Vacuum Polarization in QED	H Weigel, Stellenbosch
Nadia Solime Taou	F	Togo	An Integrated Bayesian Framework for Phenotypic Data and Population Pharmacokinetic-Pharmacodynamic Models	E Chimusa Rugamika, Cape Town
Justin Ushize Rutikanga	M	Rwanda	Assessing the effect of natural selection in pinpointing ancestry along the genome of an individual of mixed ancestry	E Chimusa Rugamika, Cape Town
Gediyon Yemane Weldegiyorgis	M	Ethiopia	Stabilization Problems with Boundary Controls for Systems of Hyperbolic Conservation Laws	MK Banda, Stellenbosch
Phumlani Lawrence Zondi	M	South Africa	The Monotone Convex Method of Interpolation - Applications to the Construction of the Yield Curve Using Octave	R Becker, AIMS



January 2014 students

January 2014 intake

Eight South Africans registered for the Master's in Mathematical Sciences programme which commenced in January 2014. They are expected to graduate in December 2014.

Students	Gender	Country	Previous Institution
Linsay Blows	F	South Africa	Stellenbosch
Tlou Lazarus Kubjana	M	South Africa	Limpopo
Matjale Clement Mabula	M	South Africa	Limpopo
William Malose Manamela	M	South Africa	Limpopo
Africa Mgudlwa	M	South Africa	Witwatersrand
Siyabonga Phiyayinkosi Mthiyane	M	South Africa	Stellenbosch
Xolisile Octavia Thusini	F	South Africa	Rhodes
Valentia Boledi Tlomatsana	F	South Africa	Limpopo



2014 BSc Honours in Mathematics with a focus in Biomathematics students

Courses towards a BSc Honours in Mathematics with a focus in Biomathematics

For the past six years AIMS South Africa has offered courses towards Stellenbosch University's (SU) Honours in Mathematics with a focus in Biomathematics. Students spend the first half of the year at AIMS and the second half of the year at SU.

Six students graduated at the end of 2013 bringing the total number of graduates to 28.

Six students enrolled in the 2014 programme: Carissa Robyn Bleker, Siphokazi Princess Gatyeni, Kathleen Alice Green, Irene Kyomugisha, Kagiso Samuel Ramolotja and Stiaan Wiehman. They completed the first semester at AIMS with a full and varied programme including computing, statistics, modelling in biosciences, mathematical epidemiology, systems biology, asymptotic methods and modelling neural systems. They

attended the "Clinic on the Meaningful Modelling of Epidemiological Data" and are now completing their second semester courses and research projects at Stellenbosch University.

The AIMS courses offered towards this programme are listed in the combined courses table on page 5.

Courses towards a BSc Honours in Mathematical Finance

The honours degree programme in Mathematical Finance run jointly by SU and AIMS and coordinated by Prof. Ronnie Becker is designed to provide students with the skills necessary for solving realistic problems in finance. This year will be the last for this honours programme in its current form but it will still be offered by SU.

The three students currently enrolled on this programme are: Oyama Balfour, Hangwelani Mamathubi and Elia Namundjebo.



Google workshop for non-profits, October 2013



Heritage Day student outing, September 2013



Student hike, February 2014

Graduations



January 2013 intake

AIMS South Africa acknowledged the achievements of its second January intake of South African students at a special ceremony held at the Institute in Muizenberg on 19 November 2013.

During the ceremony, AIMS announced a new scholarship award – the Ben and Mary Turok Award for Excellent Achievement – set up with funds generously donated by AIMS founder Prof. Neil Turok. This award honours the very generous role Prof. Ben and

Mary Turok have played in establishing the first AIMS centre and their continued interest and support. Prof. Ben Turok presented the award to Matthews Sejeso from Taung, North West Province.

The guest speaker at the event was Zebulon Vilakazi, Director of iThemba Labs. The ceremony was followed by a special lunch. All students officially graduated at their respective universities.

“I am deeply moved that a South African student has won this award as his success can now be a symbol for children in township schools that there is a future they can aspire to.”

Prof. Ben Turok, AIMS Trustee



Recognition of Achievement Ceremony November 2013



“You are now armed with this knowledge. But you would have learnt in the past few months that knowledge requires application to make it truly valuable and this is the challenge ahead of you now – to go back into society and apply what you have learnt at AIMS in order to make a difference to the lives of people.”

**Former President,
Kgalema Motlanthe**

August 2013 intake

Forty-nine students from 20 different African countries received their Master’s Degree in Mathematical Sciences at a graduation ceremony at the Muizenberg Pavilion on 25 June 2014. The guest speaker was former president of South Africa, the honourable Kgalema Motlanthe.

The ceremony was officiated by Prof. Brian O’Connell, Vice-Chancellor of the University of the Western Cape; Prof. Eugene Cloete, Vice-Rector for Research and Innovation at Stellenbosch University; and Prof. Danie Visser, Deputy Vice-Chancellor Research at the University of Cape Town.

Other speakers congratulating and inspiring the graduates included Prof. Ben Turok (AIMS Trustee), Matthews Sejeso (AIMS 2013 alumnus) and Sangree Pillay (AIMSSEC alumnus).

AIMS Endowed Scholarships were awarded to a number of top achievers: Ishmael Takyi, who received the Stephen Hawking Scholarship; Andriamanankasina Ramanantoanina, who received the Martin Rees Scholarship; Rosephine Georgina Rakotonirainy, who received the Paul G Allen Scholarship; and Shima Yasser Ahmed Hanafy Elesaely and Kenneth Dadedzi who both received the Victor Rothschild Scholarship. The awards were presented at the graduation ceremony by AIMS Advisory Board member, Dr Thandi Mgwebi.



*(Front from left) Dr Thandi Mgwebi, Shima Yasser Ahmed Hanafy Elesaely, Rosephine Georgina Rakotonirainy and Prof. Jeff Sanders
(Back from left) Ishmael Takyi, Prof. Barry Green, Andriamanankasina Ramanantoanina and Kenneth Dadedzi*



Graduation Ceremony June 2013

Post AIMS: Support, Opportunities and Alumni

AIMS Bursaries for study at South African Universities

Through the generous support of its donors, AIMS is able to offer half bursaries to its students each

year towards study at South African universities. This year AIMS awarded 19 such bursaries for Master's study and three bursaries for doctoral studies. Recipients of these bursaries are

asterisked in the table below. A further five students who will be supported in the AIMS Research Centre, are also noted.

Progress of recent graduates

Student	Gender	Country of Origin	Institution/University	Programme
Graduates from January 2013 intake				
Michael Benjamin Cromberge*	M	South Africa	University of the Witwatersrand	Research Master's
Masingita Errol Manganyi	M	South Africa	National Research Foundation	Internship
Enos Mogale Mphahlele	M	South Africa	Pursuing other opportunities	
Ndivhuwo Mphephu	M	South Africa	University of Pretoria	Research Master's
Phumlani Mzazi	M	South Africa	Liberty Financial Services	Employed
Qondisa Nxanga*	F	South Africa	University of the Western Cape	Research Master's
Moustapha Abakar Ousman	M	Chad	Pursuing other opportunities	
Matthews Malebogo Sejeso*	M	South Africa	University of the Witwatersrand	Research Master's
Graduates from August 2013 intake				
Saga Elsayed Ibrahim Abdalla	F	Sudan	Pursuing other opportunities	
Yahya Ali Abdulkadir	M	Ethiopia	University of Gondar	Teaching
Sakirudeen Akinkunmi Abdulsalaam*	M	Nigeria	University of KwaZulu-Natal	Research Master's
Simabat Agnes Adefisan	F	Nigeria	University of Manitoba Winnipeg	Research Master's
Essraa Taha Mirghani Ahmed	F	Sudan	Pursuing other opportunities	
Abdelhamid Mohamed Adam Ali	M	Sudan	Pursuing other opportunities	
Achameyesh Amare Aligaz	F	Ethiopia	Jimma University	Teaching
Rosemary Akinyi Aogo*	F	Kenya	Stellenbosch University	Research Master's
Belthasara Assan*	F	Ghana	Stellenbosch University	Research Master's
Fikreyohans Solomon Assfaw*	M	Ethiopia	University of the Western Cape	PhD
Jean Juste Harrison Bashingwa	M	Burundi	University of the Witwatersrand	PhD
Taboka Prince Chalebwa*	M	Botswana	Stellenbosch University	Research Master's
Chilombo Trevor Chimpinde	M	Zambia	Central European University	Research Master's
Kenneth Dadedzi*	M	Ghana	Stellenbosch University	Research Master's
Horace Pene Akata Ekete	F	DR Congo	AIMS Research Centre	Research Master's
Shimaa Yasser Ahmed Hanefy El-Esaely	F	Egypt	Berlin Mathematical School	Research Master's
Ikenna John Kingsley Ezike	M	Nigeria	University of Waterloo	Research Master's
Mary Ajibola Familusi*	F	Nigeria	University of Cape Town	Research Master's
Alzahraa Mohamed Fahmy Hassan Farrag*	F	Egypt	University of Cape Town	Research Master's
Andwilele Abrahamu George	M	Tanzania	Pursuing other opportunities	
Sosthene Irambona	M	Rwanda	Pursuing other opportunities	
Sarafa Adewale Iyaniwura	M	Nigeria	University of British Columbia	Research Master's
Tseliso Paul Lekhoala	M	Lesotho	Pursuing other opportunities	
Wanele Gcinumuzi Mamba	M	Swaziland	AIMS Research Centre	Research Master's
Edna Chilenje Manda	F	Malawi	University of KwaZulu-Natal	Research Master's
Xavier Mbaale*	M	Zambia	University of KwaZulu-Natal	Research Master's
Emile Fonki Meoto	M	Cameroon	Pursuing other opportunities	
Thuso Ben Modise	M	Botswana	Pursuing other opportunities	
Husam Abubakr Alsiddig Abdallah Mohamed*	M	Sudan	University of Cape Town	Research Master's
Nasilele Monde	M	Zambia	University of KwaZulu-Natal	Research Master's
Audrey Bakongia Moswa*	F	DR Congo	Stellenbosch University	Research Master's
Godfrey Edward Mpogolo	M	Tanzania	Pursuing other opportunities	
Frederic Ntirenganya	M	Rwanda	Maseno University, Kenya	Teaching
Evans Otieno Ochiaga	M	Kenya	AIMS Research Centre	Research Master's
Amos Otieno Okech*	M	Kenya	University of KwaZulu-Natal	PhD
Leakey Odoyo Omolo	M	Kenya	Pursuing other opportunities	
Fanuel Omondi Otieno	M	Kenya	Industry	Employed
Rosephine Georgina Rakotonirainy	F	Madagascar	AIMS Research Centre	Research Master's
Andriamanankasina Ramanantoanina*	M	Madagascar	University of Cape Town	Research Master's
Dinna Ranirina	F	Madagascar	AIMS Research Centre	PhD
Tamba William Saa	M	Liberia	Industry	Employed
Pie Sinangwanabose	M	Rwanda	Pursuing other opportunities	
Ridick Roland Takong	M	Cameroon	To be confirmed	PhD
Ishmael Takyi*	M	Ghana	Stellenbosch University	Research Master's
Nadia Solime Taou	F	Togo	Heriot-Watt University	PhD
Justin Ushize Rutikanga*	M	Rwanda	University of the Western Cape	Research Master's
Gediyon Yemane Weldegiorgis*	M	Ethiopia	University of Pretoria	Research Master's
Phumlani Lawrence Zondi	M	South Africa	Pursuing other opportunities	



On 14 May 2014, Director Philina Wittke and her colleague Arne Leeflang from the DAAD South Africa office visited AIMS. Nine DAAD scholarship holders made presentations on their work to the visitors.

“I am so impressed with your passion and commitment to creating change through your research.”

Dr Philina Wittke



“I am very thankful, feel most honoured and consider it a rare privilege to receive this fellowship. It will further motivate me in my research work and beyond.”

**Chika Yinka-Banjo,
2010 Graduate**

DAAD bursaries for doctoral study

This year, the German Academic Exchange Service (DAAD) generously awarded seven scholarships within its DAAD/AIMS agreement which was signed in 2008. According to the agreement in-region scholarships are awarded annually based on

recommendations by AIMS to students from sub-Saharan Africa (excluding South Africa) for PhD studies in the Mathematical Sciences. In addition to the new awards, scholarships of 14 DAAD scholars in their second and third year of study were renewed.

New awards for 2013 were made to:

Students	Gender	Country	University
Catherine Chavula	F	Malawi	University of Cape Town
Cynthia Nantsoina Ramiharimanana	F	Madagascar	Stellenbosch University
Nirina Maurice Tahiridimbisoa	M	Madagascar	University of the Witwatersrand
Pelerine Nyawo Tsobgni	F	Cameroon	Stellenbosch University /National Institute for Theoretical Physics (NITheP)
Guy Moise Dongo Nguimdo	M	Cameroon	University of the Witwatersrand
Milaine Sergine Seuleu Tchamga	F	Cameroon	University of KwaZulu-Natal
Sidiki Zongo	M	Burkina Faso	University of South Africa

A number of DAAD scholarship holders graduated during this period: Dr Siaka Lougue (September 2013), Dr Rodrigue Yves M’pika Massoukou (December 2013) and Dr David Ssevviiri (June 2013).

DAAD also supported a six-month postdoctoral fellowship completed

by Dr Ando Desire Razafindrakoto at AIMS South Africa and UWC, as well as a short-term exchange visit to the Arnold Sommerfeld School - Ludwig Maximilians University and the Max Planck Institute both in München, by scholarship recipient Nitin Chadan Rughoonauth.

Alumni

The table below summarises the progress of students who have

completed the programme at AIMS (for which information is available).

	Total	Male	Female
Graduated	528	362	166
PhD completed*	70	56	14
PhD in progress*	170	129	41
Research Master’s completed*	255	180	75
Research Master’s in progress*	96	60	36
Postdoctoral fellowship / Researcher*	46	32	14
Teacher / Lecturer*	130	90	40
Industry*	75	57	18

*As at December 2013

Chika Yinka-Banjo a 2010 AIMS South Africa graduate from Nigeria and currently a PhD student in the Department of Computer Science at

UCT, was one of the three recipients of the prestigious L’Oreal-UNESCO for Women in Science Sub-Saharan Africa Fellowship Awards.



research centre

Research Centre



Dr Ian Durbach



Prof. Cang Hui



Dr Gaston K Mazandu



Dr Wilfred Ndifon

The AIMS South Africa Research Centre was launched in 2008 and has grown significantly over the past six years, contributing to research output and capacity building in South Africa and on the continent through research activities, student training, workshops, conferences and a successful visitor's programme. Thirty-one Master's students have graduated, eleven PhDs are completed or in progress, and sixteen postdoctoral fellowships have been completed or are in progress.

In 2013, AIMS South Africa in partnership with the Universities of Stellenbosch and the Western Cape respectively, was awarded support for two research chairs under the South African Research Chairs Initiative (SARChI). Three externally-funded junior chair appointments, coordinated through AIMS-NEI, have also been made (see below).

Prof. Bruce Bassett continued his joint appointment at AIMS with SAAO and UCT along with the SARChI Chair in Astrophysics, Prof. Romeel Davé, (SARChI Chairs are funded by the Department of Science and Technology (DST) through the National Research Foundation (NRF)). Prof. Martin Kunz from the Cosmology and Astroparticle Physics Group at the University of Geneva, continued his visiting professorship with two visits taking place during the year under review.

Prof. Ronnie Becker, Dr Sehun Chun, Prof. Johan de Villiers and Dr Raouf Ghomrasni also continued their appointments. Dr Lafras Uys reduced his appointment in order to take up part-time employment doing physiological and biochemical modelling for a digital health company.

New appointments

Dr Ian Durbach joined the AIMS Research Centre in January 2014 as a part-time Resident Researcher in Multi-Criteria Optimisation. Dr Durbach assists with the supervision of projects which use statistical modelling and will also strengthen the links between AIMS and industry.

Prof. Cang Hui, who was appointed as the SARChI Chair in Mathematical and Theoretical Physical Biosciences co-hosted by AIMS South Africa and Stellenbosch University commenced his appointment in January 2014.

Prior to this appointment, Prof. Hui held a research position in the DST-NRF Centre of Excellence for Invasion Biology at Stellenbosch University, where he remains a core team member. He is also an adjunct professor at the Research School of Arid Environment & Climate Change at Lanzhou University and is on the editorial boards of several journals. Prof. Hui's work focuses on the interface between mathematics and biology. His interests lie in proposing models and theories for explaining emerging patterns in whole-organism biology, namely ecology.

Dr Gaston K Mazandu was appointed as a Joint Career Development Chair for the AIMS Centres in South Africa and Ghana. This position is funded by the Canadian IDRC. He is a mathematics graduate from DR Congo and was awarded the AIMS Postgraduate Diploma in 2005. He subsequently completed a Master's in Computer Science at Stellenbosch University, and a PhD and postdoctoral fellowship at the University of Cape Town. His current research focuses on integrating complex functional genomics data in order to analyse the factors that contribute to human susceptibility to an infectious disease in relation to a bacterial pathogen, tuberculosis, in particular.

Dr Wilfred Ndifon has also been appointed as an IDRC Joint Career Development Chair at the AIMS South Africa and Ghana centres. Originally from Cameroon, Dr Ndifon completed his PhD at Princeton University where he was a Burroughs-Wellcome Training Fellow and a postdoctoral fellow at the Weizmann Institute of Science, Israel. His research interest lies in elucidating the organising principles of T-cell repertoires in health and disease, with the ultimate goal of developing new



Dr Antoine Tambue



"I am pleasantly surprised by the broadness and depth of the AIMS Research Centre programmes. And I am encouraged to see that the Research Centre has been clever in using other instruments to help with funding, AIMS is doing it right."

Dr Daniel Adams, Chief Director of Basic Infrastructure, DST

approaches (including diagnostics) to controlling various communicable and non-communicable diseases. His main research tools are mathematics, computation, and high-throughput RNA/DNA sequencing.

Dr Antoine Tambue is the ARETÉ Junior Research Chair in mathematical methods for subsurface energy recovery and uncertainty quantification based at AIMS South Africa and the Centre for Research in Computational and Applied Mathematics (CERECAM) at UCT. His position is supported by the Robert Bosch Stiftung. After completing his undergraduate training and two Master's degrees in Cameroon, he joined the AIMS Postgraduate Diploma intake in 2007 proceeding to PhD studies in Applied Mathematics at Heriot-Watt University where he graduated in 2010. He has worked as researcher at universities in Norway where he holds an associate professorship.

With a strong background in numerical analysis, industrial modelling, stochastic analysis, computational finance and scientific computing,

Dr Tambue's interests are in developing efficient novel numerical techniques (stochastic and deterministic) to simulate physical and financial problems numerically on a computer and proving convergence of these methods.

Events

On 18 October 2013, AIMS held a Research Day at the conference facility of False Bay College. All researchers of the Research Centre, visiting research fellows as well as Research Master's and PhD students spoke about their work. Topics covered ranged from Algebraic Geometry and Number Theory, Biophysics, Cosmology, Information Systems, Mathematical Biology to Mathematical Finance and Numerical Mathematics.

Dr Daniel Adams, Chief Director of Basic Science and Infrastructure, DST, visited AIMS on 22 April 2014 to familiarise himself with the activities and facilities of the AIMS Research Centre. He was given an introduction to AIMS followed by presentations by AIMS researchers.



Researchers, students and staff at the Research Day

Postdoctoral fellows

The table below lists the postdoctoral fellows appointed at AIMS during the period under review. Dr Magdaleen

Marais has since been appointed lecturer at the University of Pretoria. Former AIMS postdoctoral fellow,

Dr Dimbinanaina Ralaivaosaona, is now lecturing at Stellenbosch University.

Name of student	Citizenship	Gender	Supervisor/Host	Research Field	Start date to end date
Aniyan, Arun	India	M	Prof. B Bassett	Astroinformatics, astrophysics, machine learning, artificial intelligence, big data	17 June – 16 December 2014
Gavhi, Mpfareleni Rejoyce	South Africa	F	Prof. J de Villiers	Optimal C3 interpolatory subdivision scheme with fractal curves	15 June 2013 – 30 June 2015
Jackson, Mark	United States	M	Prof. B Bassett	Theoretical cosmology and superstring theory - understanding how fundamental physics can be extracted from cosmological observables.	1 March – 31 August 2014
Khosravi, Nima	Iran	M	Prof. B Bassett	Theoretical and observational aspects of modern cosmology	15 Dec 2011 – 30 September 2013
Marais, Magdaleen	South Africa	F	Prof. B W Green	Computational algebra and its applications	1 Jan 2011 – 30 June 2014
Okouma, Patrice	Gabon	M	Prof. B Bassett	Cosmology with SALT and Meerkat	1 December 2012 – 30 June 2014
Ramanantoanina, Andriamihaja	Madagascar	F	Prof. C Hui	Coupling ecological and evolutionary dynamics	1 March 2014 – 28 February 2015
Sivanandam, Navin	United Kingdom	M	Prof. B Bassett	Early universe cosmology and inflation	24 Oct 2011 – 23 Oct 2014

Postgraduate students in the Research Centre

During this period the AIMS Research Centre hosted 24 postgraduate students under the supervision of AIMS resident researchers. The nine students listed below graduated during the period under review. Dr Andriamihaja

Ramanantoanina was the first AIMS alumnus to graduate with a PhD from the AIMS Research Centre. She has since been appointed as a postdoctoral fellow working with Prof. Cang Hui. Her work focuses on the understanding of

coupled ecological and evolutionary processes. PhD student Michelle Knights was awarded a UCT Faculty Research Associateship for her excellent work.

Student	Country of origin	Gender	Programme	Study duration	Supervisor	Graduation date
Al-Hassan, Hassana	Nigeria	F	Master's	1 August 2012 – June 2014	Prof. R I Becker	Graduated in June 2014.
Hassan, Ahmed Mohamed Ali Omer	Sudan	M	Master's	1 October 2012 – March 2014	Prof. J Sanders	Graduated with distinction in April 2014.
Joseph, Bernard	Zimbabwe	M	Master's	1 January 2011 – June 2013	Prof. R Becker	Graduated in June 2013.
Kassai, Eli	Namibia	M	Master's	1 August 2011 – June 2013	Prof. S Crawford and Prof. B Bassett	Graduated in June 2013.
Moir, Richard	South Africa	M	Master's	1 January 2011 (ongoing)	Prof. R I Becker	Graduated June 2014
Muzenda, Nevison	Zimbabwe	M	Master's	Jan 2011 – June 2013	Prof. R I Becker	Graduated in June 2013.
Ramanantoanina, Andriamihaja	Madagascar	F	PhD		Prof. C Hui and Dr A Ouhinou	Graduated in April 2014.
Ramiharimanana, Cynthia Nantsoina	Madagascar	F	Master's	1 July 2012 – December 2013	Prof. B Green and Prof. M Jarden	Graduated in December 2013.
Rasolofoson, Faranaina	Madagascar	F	Master's	1 August 2012 – March 2014	Dr S Chun	Graduated in March 2014.

Seminars

Theoretical ecology seminars were held in the AIMS Research Centre in April and May 2014. The seminars were hosted by the Mathematical and Physical Biosciences Group under the leadership of research chair, Prof. Cang Hui.

The Cosmology Group continued its series of seminars held on Mondays or Wednesdays. Highlights of this series included:

- “From configuration to dynamics - Emergence of time in classical field theory” by Prof. Jean-Philippe Uzan (Institut d’Astrophysique of Paris)

- “Reconstructing the Mass Assembly of Galaxy Disks over the last 7 Billion Years with ALMA, HST and Spitzer” by Dr Kartik Sheth (National Radio Astronomy Observatory)
- “Dark Matter and Pulsar Model Constraints from Galactic Center Fermi-LAT Gamma Ray Observations” by Prof. Chris Gordan (Canterbury, New Zealand).

Regular journal club meetings were held during the period under review. Students and visiting researchers presented their work to members of the Research Centre in this forum.

Highlights of the year included:

- “Galois representations” by Prof. Ravi Ramakrishna (Cornell)
- “Random permutation and ranks expectations in a sailing boat regatta” by Prof. Stephane Ouvry (Paris-Sud)
- “The real nature of quantum particles” by Dr Antoino Cardoso (AIMS South Africa)
- “Tropical Geometry and its applications” by Dr Yue Ren (Alberta)
- “Dimension results for the polynomial algebra as a module over the Steenrod algebra” by Dr Mbakiso Mothebe (Botswana).

Visiting researchers

AIMS Distinguished Research Fellows, Profs Wolfram Decker, Gerhard Pfister and Peter Sarnak visited AIMS during 2014 and the short-term visiting

researchers programme continued with 37 visitors during the period under review. AIMS received an increased number of visitors from South African

universities (11 in total) with seven researchers from elsewhere on the continent.

Name	Nationality	Status	Affiliation	Research	Dates of visit
D' Agostini, Giulio	Italy	Visiting researcher	University of Rome	Experimental physics and phenomenology	20 – 22 November 2013
AbdusSalam, Shehu	Nigeria	Visiting researcher	ICTP, Trieste	String phenomenology and cosmology	30 September – 4 October 2013
Anguelov, Roumen	Bulgaria	Visiting researcher	University of Pretoria	The Steenrod algebra; the five variable case	2 – 11 December 2013
Bere, Alphonse	Zimbabwe	Visiting researcher	University of Limpopo	Statistics	12 – 30 June 2014
Bohm, Janko	Germany	Visiting researcher	University of Kaiserslautern	Computational algebra	24 March – 12 April 2014
Chang, Chialin	Taiwan	Visiting researcher	National Tsing Hua University	Microeconomics and empirical industrial organization.	17 – 24 August 2014
Dufourq, Emmanuel	Mauritius	Visiting PhD student	University of KwaZulu-Natal	Cosmology and astronomy	13 – 19 July 2014
Fowkes, Neville	Australia	Visiting researcher	University of Western Australia	Continuum mechanics problems arising out of industrial and scientific contexts	20 – 23 January 2014
Gebbie, Tim	South Africa	Visiting researcher	University of Witwatersrand	Gent-based machine-learning as applied to proprietary algorithmic trading	5 – 12 July 2014
Hale, Nick	United Kingdom	Visiting researcher	University of Oxford	Fast algorithms for computations with orthogonal polynomials	22 – 23 April 2014
Han, Bin	China	Visiting researcher	University of Alberta	Time-scale-frequency analysis: wavelets, multiwavelets, framelets, and sampling theory	5 February – 5 March 2014
Johnson, Sarah Jane	South Africa	Visiting researcher	University of South Africa	Orthogonal polynomials, special functions, analysis	20 October – 1 November 2013
Jordaan, Kerstin	South Africa	Visiting researcher	University of Pretoria	Special functions; orthogonal polynomials; approximation theory	20 October – 1 November 2013
Karra, Abdul Hamid	South Africa	Visiting researcher	University of the Witwatersrand	Relationship between symmetries and first integrals of difference equations	15 November – 3 December 2013
Khosravi, Nima	Iran	Visiting researcher	University of Tehran	Cosmology	1 October – 4 November 2013
King, John	United Kingdom	Visiting researcher	University of Nottingham	Theoretical mechanics	16 – 23 April 2014
Kpazou, Tchiabalo Abozou	Togo	Visiting researcher	University of Lome	Beran estimation for Weibull-type tail coefficient	11 September – 10 November 2013
Kulohoma, Bernard	Kenya	Visiting researcher	University of Liverpool	Bioinformatics, functional genomics and genetics	18 August – 15 October 2013
Kunz, Martin	Switzerland	Visiting professorship	University of Geneva	Non-Gaussianity, the CMB, and generally the early universe	9 July – 21 August 2013; 27 January – 27 February 2014; 19 March – 30 April 2014
McAleer, Michael	Taiwan	Visiting researcher	National Tsing Hua University	Quantitative finance	17 – 24 August 2014
Mewomo, Oluwatosin Tope	Nigeria	Visiting researcher	University of Agriculture, Abeokuta	Functional analysis	5 August – 30 September 2013
Mothebe, Mbakiso	Botswana	Visiting researcher	University of Botswana	Algebraic topology	17 July – 16 August 2013; 16 January – 5 June 2014
Mukhodobwane, Rosinah Mphedziseni	South Africa	Visiting PhD student	University of Venda	mModelling financial Market risk premiums for SA with particular emphasis on equity risk premiums	19 – 23 November 2013
Ndifon, Wilfrid	Cameroon	DAAD postdoctoral fellow	International Institute for Computational and Systems Immunology	Population dynamics of CD4+ T cells	3 February – 2 April 2014
Nordstrom, Jan	Sweden	Visiting researcher	Linköping University Sweden	The numerical solution of time-dependent partial differential equations	16 – 23 April 2014
Ouhinou, Aziz	Morocco	Visiting researcher	University of Sultane Moulay Slimane, Beni-Mellal, Marrakech	Biomathematics	11 June – 10 August 2013
Ouvry, Stephane	France	Visiting researcher	Université Paris Sud	Condensed matter	2 – 21 February 2014
Prakash, Chumroo Vijay	Mauritius	Visiting researcher	University of Mauritius	Cosmology	25 November – 14 December 2013
Ren, Yue	Germany	Visiting researcher	University of Kaiserslautern	Commutative algebra and computer algebra	15 February – 15 April 2014
Sango, Mamadou	South Africa	Visiting researcher	University of Pretoria	Partial differential equations, stochastic processes and differential geometry	19 – 28 September 2013 23 June – 12 July 2014
Sawicki, Ignacy	United Kingdom	Visiting researcher	University of Heidelberg	The problem of dark energy in cosmology	13 October 2013 - 31 March 2014
Takou, Etienne	Cameroon	Visiting researcher	University of Yaoundé I	Kinetic theory in general relativity	2 October – 31 November 2013
Tall, Amadou	Senegal	Visiting researcher	AIMS Senegal	Cryptography	1 – 31 July 2013
Tambue, Antoine	Cameroon	Visiting researcher	University of Bergen	Time integration schemes for advection-diffusion equations with stochastic forcing and reaction terms	22 – 28 September 2013
Ter Horst, Sanne	South Africa	Visiting researcher	North-West University	Functional analysis and operator theory	20 – 21 November 2013
Wamba, Etienne	Cameroon	Visiting researcher	University of Yaoundé 1	Condensed matter physics	29 June – 28 August 2013

Research outputs

AIMS' research output has grown with publications for 2013 totalling 34 and those for 2014 totalling 19 (to August).

Further books in the AIMS Library Series are being finalised with "Solitons" by Prof. Patrick Dorey and "Mathematics of the Atmosphere" by Prof. Douw Steyn expected to be released soon.

2014 (up to August)

A Alhamud, **PA Taylor**, B Laughton, KM Hasan, AJW van der Kouwe, EM Meintjes. Assessment of Pediatric DTI Data in the Presence of Incidental Motion Using Retrospective and Prospective Motion Correction. *JMRI*. (2014) <http://dx.doi.org/10.1002/jmri.24678>.

D Anglés-Alcázar, **R Davé**, F Özel, BD Oppenheimer. Cosmological Zoom Simulations of $z = 2$ Galaxies: The Impact of Galactic Outflows. *The Astrophysical Journal*, 782(2) (2014) 84, pp 20.

R Balasubramanian, F Luca, **D Ralaivaosaona**. On the sum of the first n values of the Euler function. *Acta Arithmetica*. 163 (2014) pp 199-201. doi:10.4064/aa163-3-1

S Chun. A mathematical model of the unidirectional block caused by the pulmonary veins for anatomically induced atrial reentry. *Journal of Biological Physics*. 40(3) (2014) pp 219-258.

S Chun. Method of Moving Frames to Solve (An)isotropic Diffusion Equations on Curved Surfaces. *Journal of Scientific Computing*. 59(3) (2014) pp 626-666.

M Gaertner, R Biggs, M Te Beest, **C Hui**, J Molofsky and DM Richardson. Invasive plants as drivers of regime shifts: identifying high-priority invaders that alter feedback relationships. *Diversity and Distributions*. 20 (2014) pp 733-744.

J Kollmeier, DH Weinberg, BD Oppenheimer, F Haardt, N Katz, **R Davé**, M Fardal, P Madau, C Danforth, A Ford, M Peeples, and J McEwen. The Photon Underproduction Crisis. *The Astrophysical Journal Letters*. 789(2). (2014) L32 pp 5.

R Łochowski and **R Ghomrasni**. Integral and local limit theorems for level crossings of diffusions and the Skorohod problem. *Electronic Journal of Probability*. 19 (2014) 10 pp 1-33.

R Łochowski and **R Ghomrasni**. The play operator, the truncated variation and the generalisation of the Jordan decomposition. *Mathematical Methods in Applied Science*. (2014) doi: 10.1002/ma.3077.

X Han, **Hui C**. Niche Construction on Environmental Gradients: The Formation of Fitness Valley and Stratified Genotypic Distributions. *PLoS ONE* 9(6) (2014): e99775. doi:10.1371/journal.pone.0099775.

M Kunz et al. Planck intermediate results. XIII. Constraints on peculiar velocities. *Astronomy and Astrophysics*. 561 (2014) A97 21pp.

M Kunz et al. Planck intermediate results. XIV. Dust emission at millimetre wavelengths in the Galactic plane. *Astronomy and Astrophysics*. 564 (2014) A45 13pp.

M Kunz et al. *Planck* intermediate results. XV. A study of anomalous microwave emission in Galactic clouds. *Astronomy and Astrophysics*. 565 (2014) A103 28pp.

M Kunz et al. Planck intermediate results. XVI. Profile likelihoods for cosmological parameters. *Astronomy and Astrophysics*. 566 (2014) A54 10pp.

M Kunz et al. Planck intermediate results. XVII. Emission of dust in the diffuse interstellar medium from the far-infrared to microwave frequencies. *Astronomy and Astrophysics*. 566 (2014) A55 23pp.

M Marais and A Steenpass. Classification of Real Singularities using Singular. Part I: Splitting Lemma and Simple Singularities. *Journal of Symbolic Computation*. (2014) DOI: 10.1016/j.jsc.2014.08.007.

MD Olmstead, P J Brown, M Sako, **B Bassett**, D Bizyaev, J Brinkmann, JR Brownstein, H Brewington, H Campbell, CB D'Andrea, K S Dawson, GL Ebelke, J A Frieman, L Galbany, P Garnavich, RR Gupta, R Hlozek, SW Jha, **M Kunz**, H Lampeitl, E Malanushenko, V Malanushenko, J Marriner, R Miquel, AD Montero-Dorta, RC Nichol, D Oravetz, K Pan, DP Schneider, AE Simmons, M Smith, and SA Snedden. Host Galaxy Spectra and Consequences for Supernova Typing from the SDSS SN Survey. *The Astronomical Journal*. 147(4) (2014).

T Plieninger, **C Hui**, M Gaertner, L Huntsinger. The Impact of Land Abandonment on Species Richness and Abundance in the Mediterranean Basin: A Meta-Analysis. *PLoS ONE* 9(5) (2014): e98355.

A Ramanantoanina, A Ouhinou, C Hui. Spatial Assortment of Mixed Propagules Explains the Acceleration of Range Expansion. *PLoS ONE* 9(8) (2014): e103409.

M Smith, DJ Bacon, RC Nichol, H Campbell, C Clarkson, R Maartens, CB D'Andrea, **BA Bassett**, D Cinabro, DA Finley, JA Frieman, L Galbany, PM Garnavich, MD Olmstead, DP Schneider, C Shapiro, and J Sollerman. The Effect of Weak Lensing on Distance Estimate from Supernovae. *The Astrophysical Journal*. 780(1) (2014).

N Tejos, SL Morris, CW Finn, NHM Crighton, J Bechtold, J, BT Jannuzi, J Schaye, T Theuns, G Altay, O Le Fevre, O E Ryan-Weber, **R Dave**. On the connection between the intergalactic medium and galaxies: the H I-galaxy cross-correlation at $z \lesssim 1$. *Monthly Notices of the Royal Astronomical Society*. 437(3) (2014) pp 2017-2075.

T Wiklind, **R Dave** et al. Properties of Submillimeter Galaxies in the CANDELS GOODS-South Field. *The Astrophysical Journal*. 785(2)111 (2014) 19pp.

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J Adamek, R Daverio, R Durrer and **M Kunz**. General Relativistic N-body simulations in the weak field limit. *Physical Review D*. 88 (2013) 103527.

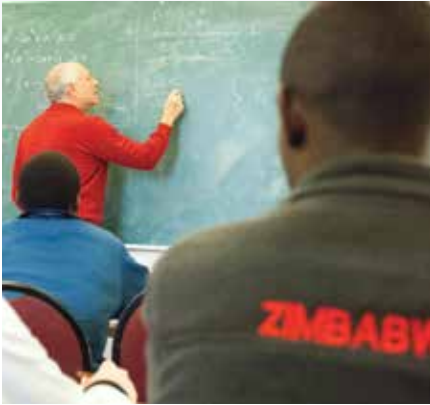
D Anglés-Alcázar, F Özel, **R Davé**. Black Hole-Galaxy Correlations without Self-regulation. *The Astrophysical Journal*. 770(1) (2013) pp 18.

R Appadu and **HH Gidey**. Time-Splitting Procedures for the Numerical Solution of the 2D Advection-Diffusion Equation. *Mathematical Problems in Engineering*. 2013 (2013) 634657 pp 20.

H Campbell, CB D'Andrea, R Nichol (ICG, Portsmouth), M Sako, M Smith, H Lampeitl, MD Olmstead, **BA Bassett**, R Biswas, P Brown, D Cinabro, KS Dawson, B Dilday, R Foley, J Frieman, P Garnavich, R Hlozek, S Jha, S Kuhlmann, **M Kunz**, J Marriner, R Miquel, M Richmond, A Riess, D Schneider, J Sollerman, M Taylor, G-Bo Zhao. Cosmology with Photometrically-

- Classified Type Ia Supernovae from the SDSS-II Supernova Survey. *The Astrophysical Journal*, 762(2) (2013).
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Workshops and Conferences



“We provided an opportunity for the contestants to sharpen their mathematical skills individually whilst being in a group environment and it is great to see the growing participation of African countries in the IMO.”

Prof. Barry Green



Prof. Neville Fowkes, with the seven AIMS students who attended the MISG workshop.

Ten conferences and workshops were held during the period under review:

The **1st Workshop on Mathematical Structures 2013** was hosted by AIMS South Africa and the Department of Mathematical Sciences at Stellenbosch University. It took place at AIMS from 2 to 7 December 2013 and was attended by 20 participants from various South African universities. Workshop activities were led by Prof. Ted van der Linde (Catholic University of Louvain) and Prof. Achim Jung (University of Birmingham). The organisers were Prof. Ingrid Rewitzky and Dr Zurab Janelidze from Stellenbosch University.

The **Working Session on Graph Theory** which took place at AIMS from 9 to 13 December 2013 was attended by 14 participants. The aim of the session was to bring together mathematicians from South Africa and neighbouring countries, and to facilitate joint and focussed research away from the usual obligations. The session included activities to publicise graph theory as a discipline within mathematics and an attractive area for mathematical research; an introductory lecture on graph theory; as well as a research lecture for AIMS students already familiar with graph theory.

A group of seven students attended the **MISG (Mathematics in Industry Study Group)** and preparatory workshop held at the University of the Witwatersrand (Wits). This combined Wits/AIMS event supported by the AIMS Research Centre was organised, once again, by Prof. David Mason from Wits. Prof. Neville Fowkes, an Associate Professor at the School of Mathematics and Statistics at the University of Western Australia was one of the facilitators and speakers at MISG. He visited AIMS from 20 to 23 January to continue working with students who attended the workshop.

The **7th Summer School in Mathematical Finance** was held at AIMS from 20 to 22 February 2014. This workshop presented a unique

opportunity for local practitioners, academics and students to interact with international leaders on current research topics and modelling techniques in the South African and international financial markets. International lecturers included Prof. Daniel Bauer, Luca Capriotti and Prof. Eckhard Platen. The school was attended by 40 attendees (including six AIMS research students), academic staff and financial practitioners.

The first hands-on **Machine Learning workshop using the JEDI format** was held at AIMS South Africa on 12, 13 and 26 April. The workshop provided an introduction to machine learning for big data problems as well as some algorithms and existing packages for machine learning. Apart from an industry keynote address and a panel discussion, the majority of the workshop was dedicated to problem-solving of real machine problems. The 33 participants were divided into dynamic teams which attempted to solve some identified problems. The results were presented on the last day.

The **Clinic on the Meaningful Modelling of Epidemiological Data 2014** The South African Centre for Epidemiological Modelling and Analysis (SACEMA), in collaboration with AIMS South Africa, held a two-week modelling clinic from 2 to 14 June 2014. The focus was on bringing together mathematical modelling ideas with practical approaches to infectious disease data and policy. The clinic emphasised the use of data in understanding infectious disease dynamics and brought together graduate and postdoctoral students and researchers from North America and Africa.

The last two days of the **I-CAMP 14 Summer School** on Geometry and Topology in Soft Matter, Optics, and Biological Systems was hosted by AIMS South Africa from 26 to 27 June 2014.

IMO Training Camp: 58 contestants from 12 African countries gathered at AIMS South Africa for a final training



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Key:

- 1 1st Workshop on Mathematical Structures
- 2 Working Session on Graph Theory
- 3 7th Summer School in Mathematical Finance
- 4 Machine Learning workshop using the JEDI format
- 5 The Clinic on the Meaningful Modelling of Epidemiological Data
- 6 I-Camp 14 Summer School
- 7 IMO Training Camp 2014
- 8 Namibian JEDI workshop
- 9 Mathematics iff Computing Workshop



“... the way the lecturers contributed to the workshop seemed like it was a calling for them rather than a job or something they’ve been asked to do and that kind of a spirit is very stimulating and exciting.”



“The workshop was excellent. I’ve learnt a lot and am starting to develop an interest in Python language.”

Feedback received from students who attended the Mathematics iff Computing Workshop.

camp from 30 June to 6 July, before participating in the International Mathematical Olympiad (IMO) hosted by UCT from 8 to 9 July. Team members (all high school learners) from Benin, Burkina Faso, Gambia, Ghana, Ivory Coast, Morocco, Nigeria, Tanzania, Tunisia, South Africa, Uganda and Zimbabwe attended mathematical lectures and reviewed previous IMO papers to ensure that they were exposed to as many as possible mathematical problems and could practice how to get to the answer with the best possible solution. The main sponsors of the 2014 IMO were the Department of Basic Education, Google, SABC Education, South African National Roads Agency Ltd and Sasol.

The Cosmology Group at AIMS South Africa jointly organised the first **Namibian JEDI Workshop** in Windhoek from 30 June to 6 July. The workshop was funded by the Office for Astronomy Development at the International Astronomical Union and the Namibian

Council for Science, Research and Technology. The workshop used the very successful JEDI workshop model which uses real research projects to allow students to simultaneously learn research, teamwork, and presentation skills while building their research networks. The more than 20 participants also enjoyed a visit to the world-leading Namibian gamma-ray telescope array HESS. This was the tenth in the series of JEDI workshops (<http://jedi.sao.ac.za>) pioneered by Prof. Bruce Bassett (AIMS, SAAO and UCT).

Thirty-seven South African students (3rd or 4th year of study) attended the **Mathematics iff Computing Workshop** held at AIMS from 14 to 18 July 2014. Students were taught programming and how to use the required software. They were given lectures and demonstrations from experts and the opportunity to construct prototypes of the systems that were demonstrated, for example, machine learning and animation systems.



AIMSSEC

AIMS Schools Enrichment Centre



AIMSSEC promotes active enquiry based learning, mathematical thinking, communication and problem solving skills.



AIMSSEC broadcasts whole day TV lessons for mathematics teachers via satellite to learning centres around South Africa.

From its inception in 2003, AIMSSEC's focus has been on teacher development, running a variety of blended-learning courses for in-service teachers concentrating on deepening content knowledge and introducing effective teaching strategies.

AIMSSEC is building capacity to meet the pressing demand from teachers for professional development. In South Africa, many teachers lacking mathematical qualifications have been required to teach mathematics. It is essential that these teachers are trained in order to provide young learners with a good mathematical education. Teachers need lifelong learning to keep up to date with content knowledge, teaching techniques and the changing demands of the world of work. AIMSSEC also offers Mathematics Subject Leader Training courses to enable teachers to train other teachers.

The combination of the Mathematical Thinking (MT) and Advanced Certificate in Education (ACE) courses provides an in-service training programme for mathematics teachers from intermediate, senior and further

education and training (FET) phases. These courses prepare mathematics teachers who are mathematically under-qualified to be more effective teachers, heads of department and subject advisers. The aim of the programme is to improve the teachers' content knowledge, to train them as subject leaders in their field and to establish networks of support among the teachers. The programme makes use of a blended learning approach combining face-to-face contact, home study, regular submission of assignments, interactive telematic sessions, discussions via the Moodle course management system and formal examinations.

Over the past eleven years, the AIMSSEC three-month **Mathematical Thinking course** has been run twenty-two times for 1 240 teachers and subject advisors from all parts of South Africa. There is significant evidence that the Mathematical Thinking course is transformative. The Mathematical Thinking summary report indicates that there has been progression from one assignment to the next. This is primarily due to the teachers' exposure to learner-centred activities during the



The attendants of the residential courses held from 3 to 11 January 2014 at Stellenbosch High School (57 ACE students, five Maths with Wings students, 71 MT21 students and 19 lecturers). Twelve of the lecturers were South Africans and seven lecturers came from universities around the world. Three teaching assistants, who were former AIMSSEC students, supported the classes at the residential course.



“By the time I completed this course I was enriched not just in mathematics but teaching as a whole.”

Jacky Johnson (MT FP 2014)

	Pre-test mean	Post-test mean	Shift in mean
Intermediate Phase overall	40%	68%	28%
Senior Phase overall	6%	58%	52%
FET overall	35%	52%	17%

Table 1: ACE pre- and post-test results

“The problem solving approach I have been taught helped me a lot in solving problems I never thought I could be able to solve. Visualisation is going to help my learners too.”

Thobeka Thelma Bobo-Gqibitole (ACE IP 2014)

residential courses; the opportunity for extensive engagement with other teachers across provincial boundaries; the detailed developmental feedback for the first assignment on ways to improve on pedagogical practice and the result captured in the second assignment. The latter was quantified as a mean shift of 5.3 percentage points for the MT21 course in January 2014.

The **Advanced Certificate in Education (ACE)** to train Mathematics Subject Leaders is a two-year blended learning programme with four residential units, taught in partnership with the University of Fort Hare (UFH). It is currently an ACE course at NQF Level 6, but it will be adapted to align with new Advanced Certificate in Teaching (ACT) accreditation criteria. The AIMSSEC/ University of Fort Hare ACE programme is the subject of a three-year research and evaluation study by Kelello Consulting and Professor Jill Adler and is funded by the Zenex Foundation.

The final version of the third part of the evaluation report of our programme was released by Kelello on 13 June 2014. AIMSSEC is very proud of the many positive aspects highlighted in the report. Table 1 on the left was taken from page 9 of the Executive Summary and compares the pre- and post-test averages of students completing the course, and shows marked improvement across all phases. ACE pre- and post-test results.

The objective of the **Aiming Higher Maths with Wings (AHMwW)** Course is

to empower teachers from government schools to develop their most able students to an internationally equivalent university entrance standard. The level of the mathematical content course is equivalent to that of the South African Independent Examination Board (IEB) Advanced Mathematics Programme (or a single subject A level mathematics in the United Kingdom). Two two-week residential units held during school holidays in July 2013 and January 2014 were interspersed with blended learning and assignments. The volunteer lecturers were: Dr Julia Anghileri (University of Cambridge), Dr Alison Clark-Wilson (London Institute of Education), Dr Jenny Gage (University of Cambridge), Prof. John Mason (retired, Open University), Prof. Frode Ronning (Trondheim Norwegian University of Science & Technology), Prof. Dudu Sibaya (University of Zululand), Dr Kosie Smit (retired, Stellenbosch University), and Diana Townsend (retired, International School, Brussels).

From 29 to 31 January 2014 three representatives from AIMSSEC attended the launch conference of the **FaSMEd** (Improving progress for lower achievers through Formative Assessment in Science and Mathematics Education) **project** funded by the European Commission FP7 Science in Society in Newcastle, United Kingdom. The project is being undertaken by a consortium of European universities, led by Newcastle University with AIMSSEC as the only non-European partner. AIMSSEC has appointed Dr Marie Joubert as principal investigator and Ingrid Mostert as



On 5 May 2014, the second group of 42 ACE students graduated from the University of Fort Hare. Pictured here are a few students, a lecturer and Mninawa Xozwa from the Eastern Cape Department of Education, who attended the ceremony.



Dr Marie Joubert with teachers.

part-time researcher for this project. The two main research components are:

- a design research phase (January 2015 to December 2015) to develop a “toolkit” comprising classroom activities with an emphasis on formative assessment (tasks, lesson plans and guidance for teachers)
- a case study phase (January 2016 to September 2016) in which between 20 and 30 other teachers use the toolkit in their classrooms.

A synthesis phase will follow in which all case studies will be analysed to draw out key messages and inform policy.

AIMSSEC supports current students and alumni through the **AIMING HIGH** online community www.aiminghigh.aimssec.org and provides an online forum to discuss a student-centred approach to teaching and learning mathematics. Cell phone access to the internet enables the sharing of ideas support. AIMSSEC uses Interactive

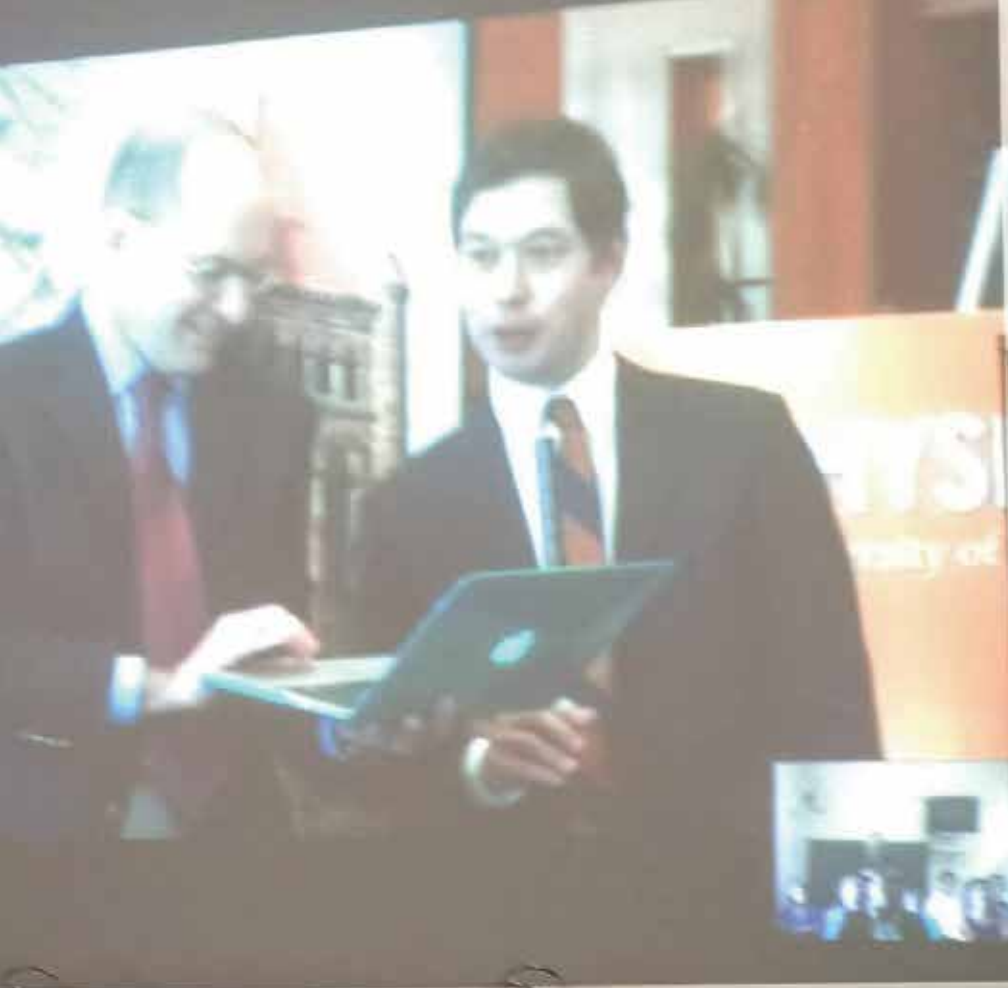
Telematic Education (ITE) to broadcast to ACE students at five learning centres in the Eastern Cape.

In 2014, False Bay FET College and AIMSSEC formed a **partnership** to promote student-centred learning across four campuses. AIMSSEC delivered professional development services and ongoing support to mathematics and mathematics literacy lecturers at the college. The collaboration is being expanded to other FET colleges across the Western Cape.

While maintaining and strengthening its global links and its involvement with local community schools, AIMSSEC plans to expand its distribution of free interactive resources; to promote activity-based learning to support the South African school mathematics curriculum; and to support similar programmes based in AIMS Sénégal, AIMS Ghana, AIMS Cameroon and AIMS Tanzania.



In the 2014 winter school holidays 97 teachers attended the MT22 course and the 54 ACE students had their fourth residential course. The photo above shows all these participants.



outreach,
joint initiatives
and meetings

Outreach



University of Venda lecturers visit AIMS

Visits and outreach to South African universities

During September Prof. Barry Green visited the universities of Limpopo, Pretoria and the North West where he spoke to staff and students about the opportunities that AIMS offers.

Four lecturers from the University of Venda visited AIMS South Africa on 6 and 7 March to learn more about AIMS' academic programmes and IT infrastructure, and to discuss avenues of collaboration. The lecturers were Dr Simiso Moyo, head of the Department of Mathematics and Applied Mathematics; Dr David Tinarwo, lecturer in the Department of Physics; Dr Kudakwashe Madzima, lecturer in the Department of Computer Science and Information Systems; and Alphonse Bere, lecturer in the Department of Statistics.



“While talking with attendees during and after the event, I had the impression that everybody enjoyed the presentation we gave in our stall and understood what AIMS is and what we do.”

Rejoyce Gavhi, Postdoc

Exhibitions and talks

AIMS exhibited at the NRF National Postdoctoral Forum held in Stellenbosch from 4 to 6 December 2013 to create awareness of AIMS Research Centre's activities. AIMS postdoctoral fellows who attended were: Dr Patrice Okouma, Dr Ignacy Sawicki, Dr Rejoyce Gavhi, Dr Magdaleen Marais and Dr Navin Sivanandam.

AIMS exhibited at the official launch of National Science week which was held in Bloemfontein on 2 August 2014. The AIMS team consisted of Dr Rejoyce Gavhi, Lesiba Charles Galane and Lynne Teixeira. The exhibition was attended by around 5000 secondary school learners and students. The main purpose of the event was to expose students to the fields of science, mathematics, technology and engineering.



Lesiba Charles Galane talks to attendees at the National Science Week exhibition

Dr Gavhi delivered a keynote address at the NRF's South Africa PhD conference which was held in Venda on 24 February 2014. The title of her talk was “Embarking on a PhD”.

South Africa's National Science Festival which took place in Grahamstown from 12 to 18 March and is sponsored by the Department of Science and Technology, devoted one of its sessions to a Science Slam where excellent young researchers present their research topics in an informative and entertaining matter to a mixed audience of pupils, students and scientists. Dr Gavhi participated as a slammer in the Science Slam with a presentation titled: “Geometric Modelling in Animated Movies”.

AIMS online

AIMS South Africa has continued to film selected courses from its academic programme and to make them available to a larger audience as an online facility. The repository provides students across the AIMS network the opportunity to attend courses offered by AIMS South Africa. For example, Prof. Alan Beardon's highly interactive course on mathematical problem solving is being used as a teaching aid at AIMS Cameroon. These courses will also serve as a powerful tool for outreach to African universities which can make use them to enhance their own postgraduate programmes and to promote the growth of the African mathematical sciences ecosystem.

Two additional three-week courses were made available for streaming on the AIMS' YouTube channel: “Topology and Geometry” by Dr Tadashi Tokieda and “Electromagnetism” by Prof. Robert de Mello Koch. The talk “Life before Vectors” by Prof. Alan Beardon was also uploaded.



There has been an increase in emphasis on entrepreneurship at AIMS. Talks in this theme have been added to the repository: Mmabatho Mokiti's presentation to students on "The Business of Mathematics" and "Studying Entrepreneurship at AIMS", an interview with Prof. Graham Richards from the University of Oxford.

To view the repository please visit <http://www.youtube.com/user/AIMSacza>

Public Lecture Series

AIMS continued presenting its series of public lectures with the following events taking place during the period under review:

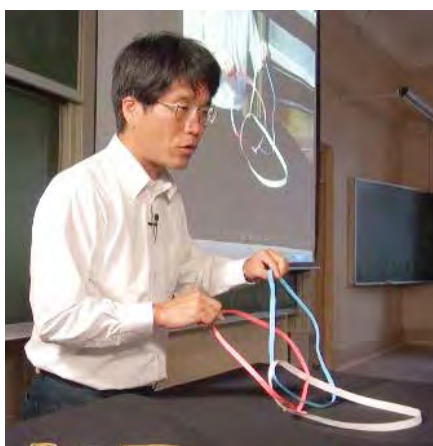
- On 3 September **Prof. Bruce Bassett (AIMS, SAAO, UCT)** gave a talk titled: "A brief history of the future". The talk was "a guided tour of the exciting, frightening and awe-inspiring future that is being forged day-by-day in a hyped-up world that no longer sleeps...." From artificial intelligence to genetics to the military, this talk introduced the astonishing yet almost invisible revolutions going on around us. (Available online on the AIMS YouTube channel).
- On 1 October a talk on medical statistics titled "What's going to get you in the end? Measuring and communicating the risks of daily life" was given by **Prof. David Spiegelhalter (Cambridge)**.
- On 10 December, **Prof. Claude Carignan, South African SKA (Square Kilometre Array) Research Chair in Multi-Wavelength Astronomy in the Department of Astronomy of the University of Cape Town** gave a talk titled, "The SKA: a fantastic opportunity for South Africa and the African continent".



Prof. Bruce Bassett



Prof. Claude Carignan



Dr Tadashi Tokieda

- **Dr Tadashi Tokieda (AIMS, Cambridge, Harvard)**, gave a talk on 21 January titled "Magic with a ribbon, paper clips, rubber bands." Dr Tokieda showed a medley of magic tricks to illustrate that there is perfectly good mathematics everywhere.
- On 25 February, **Prof. Bin Han (Alberta)** gave a talk titled: "What is a wavelet and why is it useful?"
- Members of the **Cosmology Group in the AIMS Research Centre** gave a talk on 25 March AIMS titled: "Gravity waves detected from the Big Bang". The talk covered the BICEP (Background Imaging of Cosmic Extragalactic Polarization) team's amazing discovery of gravitational waves in the fabric of space time left over from the first tiny fraction of a second after the Big Bang.
- On 29 April, AIMS South Africa hosted a **TEDxAIMSSalon** event titled "Our Future: The good, the bad and the ugly". The evening featured four TED talk videos on topics ranging from brain-reading devices to hacking and government surveillance.
- **Prof. Frank Brombacher, ICGEB (International Centre for Genetic Engineering and Biotechnology) and UCT** gave a talk on 20 May, titled: "Health & Disease: insight from genetic manipulation of mammals".
- The **second TEDxAIMS** took place on 22 June, with the theme "Alone in a Crowd". An audience of over 200 from the wider AIMS community came to enjoy the stimulating talks, music and engaging conversation. Nine speakers came from all over world to share their ideas and stories.



TEDxAIMS June 2014

Joint Initiatives and Meetings



Prof. Barry Green and Prof. Bruno Delvaux, Université catholique de Louvain sign the MOU.



“We look forward to the exciting interaction this partnership will facilitate, contributing to our goal of building science in Africa.”

Prof. Barry Green



AIMS Network team at the AfrEA conference

On Friday 25 October 2013, a delegation representing several universities from Belgium visited AIMS South Africa. The institutes included the Inter-university Committee for International Relations, Université Catholique de Louvain, Université Libre de Bruxelles, Université de Liège and Université de Mons. A **memorandum of understanding** declaring a firm intention to collaborate around staff exchanges, research activities and the exchange of academic material was signed during the visit.

AIMS South Africa welcomed the Departments of Mathematics and Physics, and the Graduate College of the University of Illinois at Urbana-Champaign as the first partners in the **AIMS Institute Partners Programme**. The partnership was formalised in an online ceremony on 23 January 2014. Visiting lecturer to AIMS South Africa, Prof. Steve Bradlow, was instrumental in setting up the partnership which provides for University of Illinois funding for AIMS; teaching visits to AIMS by Illinois faculty; and the recruitment of potential graduate students.

AIMS South Africa has been included as a partner of the **NRF-DST Centre of Excellence (CoE) in Mathematical and Statistical Sciences (MaSS)** which was awarded to the University of the Witwatersrand. The research focus of the centre falls under two themes reflecting the pure and applied nature of mathematics: ‘Mathematical Paradigms for Earth and Environment’ and ‘Mathematical, Statistical and Computational Modelling of the Earth and Environment’. The centre will bring together the existing research excellence in universities, research entities and other CoEs. Prof. Green attended the launch on 1 April 2014.

Prof. Barry Green and Prof. Bruce Bassett attended a two-day workshop on **“Future UK - South Africa Research Collaborations”** which brought together scientists, funding bodies, and other relevant organisations involved in research and innovation in both countries. The event was held in Cape

Town from 10 to 11 February 2014 and was jointly organised by South African government departments and the British High Commission in South Africa.

Administration and Research Manager, Lynne Teixeira, attended a workshop in Pretoria on the findings of an evaluation on the **NEPAD Flagship programmes**. The evaluation found that AIMS is meeting its objectives and recommended that the DST continue supporting it as a NEPAD Flagship programme. She also attended a meeting called to develop a South African position on the draft Science, Technology and Innovation Strategy for Africa 2014.

Prof. Green attended the **Joint meeting of the South African Development Community’s Ministers of Science, Technology and Innovation** held in Maputo on 20 June 2014. At the meeting, a SADC Draft Indicative Strategic Development Plan was adopted. AIMS is included as one of the Flagship Programmes.

Prof. Green attended the **German Academic Exchange Service (DAAD) Roundtable** on developing a new DAAD Africa-Strategy for cooperation in higher Education. The event took place in Johannesburg on 7 and 8 April 2014. He gave a presentation on AIMS as a case study, as AIMS has been working with DAAD since 2008. It was noted that of the 46 DAAD scholars that have been processed through AIMS, 32 are AIMS Alumni and so far 19 have completed their PhDs. Four DAAD postdoctoral fellows have also been funded through this programme (three were based in the AIMS Research Centre).

Lynne Teixeira formed part of an AIMS Network team which attended the **7th African Evaluation Association (AfrEA) International Conference** on “Evaluation for Development” from 5 to 7 March 2014. The conference took place in Yaoundé, Cameroon. The AIMS network delegation also took the opportunity to meet and plan monitoring and evaluation activities in the network.



the AIMS network

The AIMS Network



AIMS Cameroon launch February 2014

“The opening of a fourth institute in Cameroon is important because it adds to a growing force for Africa. It increases a pivotal pool of young scientists ready to meet the developmental challenges of this continent.”

Thierry Zomahoun,
President and CEO AIMS-NEI



Cameroonian delegation visit
September 2013

New AIMS centre in Cameroon

On 7 October 2013, the fourth AIMS centre was opened in Limbe, Cameroon with 36 students, including 12 women, from 15 African countries.

The establishment of AIMS Cameroon was made possible through strong support from the Cameroon government, the IDRC and DFID.

The official opening took place on 19 February 2014 in Yaounde and was attended by Prime Minister Philémon Yang and members of his Cabinet; the Chancellor of the University of Ottawa and international mathematicians and physicists including Prof. David Gross, Nobel Laureate 2004; Prof. Klaus von Klitzing, Nobel Laureate 1985; and Prof. Cedric Villani, Fields Medal 2010.

Graduations from Network Centres

On 21 June 2014, AIMS Ghana held its second graduation ceremony to award 40 students with Master's Degrees in Mathematical Science. The students included 12 women and were from 16 African countries.

The third AIMS Sénégal Graduation ceremony was held on 13 June 2014, 46 students graduated from 20 African countries. The graduates included 13 women.

The first graduation ceremony for AIMS Cameroon took place on 10 July 2014, with all students graduating.

AIMS Tanzania

AIMS NEI finalised the plan to open the fifth AIMS centre in Tanzania during the course of this year. AIMS Tanzania is expected to open in October 2014.

AIMS South Africa's support for the Network

AIMS South Africa has hosted a number of visitors who are involved with the establishment of other AIMS centres. A ministerial delegation of academics from Cameroon visited AIMS South Africa on 20 September 2013. Their visit included meeting the students, tutors, administrative staff, members of the Research Centre and AIMSSEC.

Newly appointed staff at other AIMS Centres visited AIMS South Africa on Monday 23 September for discussion and interaction with staff. These included Prof. Mama Foupouagnigni, Academic Director and Mr Veran Ahouantchemé, Chief Executive Officer, both from AIMS Cameroon.

AIMS South Africa staff continue to assist with various aspects of centre establishment: Prof. Green chaired the AIMS Sénégal Academic Council's annual general meeting held on Wednesday 30 April 2014 in Sénégal. The meeting included a review of all the academic aspects of the past year and planning for the coming year. Academic Director, Jeff Sanders taught at AIMS Ghana and AIMS Cameroon. Staff from the AIMS Information Technology Department (IT) made visits to AIMS Cameroon and Ghana to assist with the establishment of IT facilities there.



Representatives from AIMS-NEI meet with H.E. Jakaya Kikwete, President of Tanzania and his Minister of Education and Vocational Training, Shukuru Kawambwa in May 2014.

“Tanzania will be our fifth centre and we are proud of what we’ve accomplished to date”

Prof. Neil Turok, AIMS founder



The AIMS Network Leadership meeting July 2013

Network meetings

A branding workshop for AIMS was held on 15 November 2013 in Wiesbaden, Germany. Fifteen participants, including senior management from South Africa, Senegal, Tanzania, Ghana, the advancement chapters in the United Kingdom, Nordic countries, Canada and Germany and members of the AIMS-NEI Global Secretariat participated in the workshop which was facilitated by Jeff Callender, Managing Director and Paul Koch, Creative Strategist, from Q Ltd branding.

AIMS South Africa staff attended a Network Review and Planning Session

which was held in Cape Town from 14 to 17 January 2014. The overall objective of the gathering was to provide updates on current initiatives, take stock and make plans for 2014-2015.

The AIMS Network Leadership meeting was held in Cape Town from 28 to 31 July 2013. In attendance were representatives from all centres (including AIMS Tanzania due to open later in the year). The meeting provided clarity on issues relating to governance, branding, advancement, training, research, roles and responsibilities, and priorities over the next 6 to 12 months.



AIMS Ghana Graduation Ceremony



AIMS Senegal Graduation Ceremony



AIMS Cameroon Graduation Ceremony

Governance and Administration

“Prof. Russel Botman, Rector and Vice-Chancellor of Stellenbosch University (SU), served both as a trustee of AIMS South Africa and as board member for AIMS-NEI. He provided invaluable help and advice as the centre grew over the years, and both he and SU were enormously supportive of AIMS’ expansion to new centres across Africa.”

Prof Barry Green

Trust

The AIMS Trust is a registered charitable trust with tax exemption with the following appointed trustees: Profs Russel Botman (deceased 28 June 2014), Fritz Hahne, Keith Moffatt, Brian O’Connell, Daya Reddy, Ben Turok and Neil Turok (Chair). The AIMS Trust met in Cape Town on 21 February 2014.

Council

AIMS South Africa is governed by a Council which includes representatives of each of the six partner universities. The AIMS Council met on 21 February 2014. Its current members are Prof. Ramesh Bharuthrum (University of the Western Cape), Prof. Cheryl de la Rey (University of Pretoria), Prof. Hendrik Geyer (Stellenbosch University), Prof. Stephane Ouvry (Université de Paris Sud XI), Prof. Daya Reddy (University of Cape Town), Prof. Graham Richards (Oxford University), Prof. Balazs Szendroi (University of Oxford), Prof. Grae Worster (University of Cambridge), with Prof. Neil Turok (Perimeter Institute) as Founder and Chair, and the Director of AIMS, Prof. Barry Green, as an ex-officio member.

Advisory Board

The AIMS Advisory Board advises on strategic and academic aspects of the AIMS programme, in particular its integration with existing courses and research projects in South African and other African universities. The Board

meeting held on 3 March 2014 was chaired by Dr Sizwe Mabizela (Rhodes University). Current members are: Prof. Edward Lungu (University of Botswana), Ms Nasima Badsha (CHEC), Prof. Jacek Banasiak (University of KwaZulu-Natal), Prof. Eugene Cloete (Stellenbosch University), Prof. David Fisher (University of the Western Cape), Prof. Barry Green (AIMS), Prof. Louis Labuschagne (South African Mathematical Society), Dr Thandi Mgwebi (NRF), Dr Sibusiso Sibisi (Council for Scientific and Industrial Research), Prof. Danie Visser (University of Cape Town) and Dr Zebulon Vilakazi (University of the Witwatersrand).

Executive Team

Prof. Francis Benyah (University of the Western Cape), Dr Hannes Kriel (Stellenbosch University), Prof. Nicola Mulder (University of Cape Town), Dr Rafiq Omar (University of the Western Cape), Dr Jessie Ratzkin (University of Cape Town) and Prof. Ingrid Rewitzky (Stellenbosch University) served on the Executive Team for the period under review. The team assists the Chair, Prof. Barry Green and Academic Director Prof. Jeff Sanders, with the selection of students for the structured Master’s programme and the DAAD scholarships. The Executive Team’s additional role is to facilitate the relationship between AIMS and the three participating South African universities.



AIMS South Africa Council Members with Dr Dorothy Nyambi (Executive Vice-President, AIMS-NEI) at a meeting in February 2014.



AIMS South Africa Tutors

Staff

New appointments this year included Jo-Anne Louw who joined as Finance Officer, Lindiwe Tshuma who joined AIMSSEC as Primary Mathematics Specialist, Dr Marie Joubert as Principal Investigator and Ingrid Mostert as part-time researcher for the FaSMed project.

AIMS Director, Prof. Barry Green, is assisted by the Management Team consisting of Dr Barrie Barnard (AIMSSEC Manager), Jan Groenewald (IT Manager), Igsaan Kamalie (Facilities Manager), Prof. Jeff Sanders (Academic Director), Lynne Teixeira (Administration and Research Manager) and Deborah Wilsnagh (Finance and Human Resources Manager).

The following staff members continued in their positions: A'eeda Rhodes and Rene January (Administration), Linda Camara (Communications) and Yasmin Hankel (New Media Specialist), Liesl Felix (Finance), Waseem Elliot (IT); Fazley Jattiem, Emmanuel Kongolo and Nazeer Kamalie (Facilities) and Dr Claire Blackman, Sinobia Kenny, Najwa Chellan and Virginia Davidson (AIMSSEC).

Lecturers and Tutors

Resident teaching faculty at AIMS include Frances Aron as the English and Science Communication Lecturer and Jan Groenewald as the lecturer in Computing. Visiting lecturers are invited to teach courses on the AIMS Master's and the Honours programme (see p6).

AIMS appointed the following tutors to assist the visiting lecturers: Chama Bensmail, Adriaan Janse Van Vuuren, Markus Kruger, Evans Ocansey, Tovondrainy Christalin Razafindramahatsioro, Eva Liliane Ujeneza, Martha Ndeyapeumagano Kamkuemah, Hilaire Mambo Mobebe, Antonio Manuel Bondoso Cardoso, Eric Andriantiana, Morgan Kanga Pene and Mekdes Tessema.



AIMSSEC Staff



AIMS South Africa staff



Android Development Workshop



As part of the graduation ceremony a short film was made about the experiences of the graduating AIMS students, to view online please go to <http://youtu.be/ZJxx41Eno0s>



Information technology

In the period under review the IT department's focus was on hardware upgrades (without service interruption), training, teaching, IP-PBX functionality, and improving the installer for the AIMS-desktop software distribution.

Four decade-old SUN servers – donated at the launch of AIMS in 2003 – were decommissioned and all services migrated to new hardware, covering all core campus networking and authentication services. In addition, IP-PBX call reporting, PINs, and ring group functionality were expanded. Liaison with Stellenbosch University IT staff led to the upgrade to an IPSEC VPN for secure access to the SU finance system used by AIMS. A new AIMSSEC office in Main Road, 350 metres from the main campus building, was wirelessly and transparently linked to the main campus network, including latency monitoring for VoIP traffic. Claire Blackman took over IT operations at AIMSSEC, including an independent Google Apps for Education instance at domain aimssec.ac.za.

In an ongoing collaboration, South African Astronomical Observatory (SAAO) IT staff Hamish Whittal and Gareth Dugmore attended a Software Development with Python course at AIMS South Africa. Waseem Elliot attended IP-PBX training at SAAO, as well as the conferences AfriNIC IPv6 training, PyConZA 2013 and Scaleconf 2014. Two IT staff exchanges were organised; Waseem Elliot with Steve Noubissie from AIMS Cameroon, and Evans Ocansey with Kafui Dake from AIMS Ghana. Work with Steve focussed on IT planning for AIMS Cameroon and with Kafui on the network-wide AIMS-desktop software platform for teaching and research. Jan Groenewald attended the "Tertiary Education Network Campus Readiness" workshop which was held November.

Students commencing with the structured Master's programme both in August 2013 and in January 2014 took courses in Computing and LaTeX, Ubuntu for Science, online collaboration, revision control and in the statistical modelling software R. IT tutor duties were expanded to

include more teaching, workshop support, and generic IT support. This expansion will be continued in 2014-15 with two tutors acting as IT assistants.

Support around web servers and planning for AIMS Tanzania which is expected to open in October 2014 was provided to AIMS-NEI.

Communications and new media

The AIMS South Africa newsletter design was revised; new brochures were created and printed for the AIMS Research Centre and for AIMSSEC; and posters and other printed literature were created for use at various exhibitions.

The audio visual media created by AIMS South Africa, used for promotion and educational development has expanded in audience, applicability, and themes. On the AIMS South Africa social media platforms the statistics and comments show positive response towards the material currently available.

Two big events were filmed at AIMS South Africa in the period under review: TEDxAIMS and the June graduation ceremony. This year the events were recorded from five and three angles, respectively. Audio-visual footage was used during the graduation ceremony and this footage is re-edited and used for promotional purposes at conferences and exhibitions.

AIMS now takes professional portraits of students, staff and visitors and these can be used for promotional materials as well as for job/study applications by students.

Facilities

Much of the work of the facilities department focused on upgrading fire prevention and management equipment and features. A new fire escape, fire separation doors/wall and a smoke extraction system were installed in the main building (as per fire regulations). An addressable fire detection system and a public announcement system in the main building were also completed.

Offsite AIMS residences were upgraded to improve parking areas and security.

financial reports



UNIVERSITEIT SIEFF ENDRISCH-UNIVERSITEIT
UNIVERSITY OF STellenbosch

STELLENBOSCH UNIVERSITY

AIMS

Financial Statement for the year ended 31 December 2013

	TOTAL	GENERAL OVERHEAD COSTS	TAUGHT MASTERS PROGRAMME BURSARIES	ACADEMIC PROGRAMME	POST AIMS BURSARIES	HONOURS PROGRAMME BURSARIES	RESEARCH PROGRAMME	ENDOWED SCHOLARSHIPS	NEXT EINSTEIN INITIATIVE & AMINET	PRIOR YEAR 31/12/2012
TOTAL INCOME	R 22 093 287	R 5 505 752	R 6 456 928	R 6 244 000	R 3 094 691	R -	R 550 000	R 241 910	R -	R 38 945 982
DAAD	R 1 743 755				R 1 743 755					R 1 613 082
Department of Higher Education (2013/14)	R -4 594 000			R 4 594 000						R 4 400 000
Department of Science and Technology	R 2 800 000			R 1 650 000	R 600 000		R 550 000			R 2 600 000
Friends of AIMS	R 43 500		R 43 500							R 23 000
Foreign Exchange Profit	R 1 267	R 1 267								R 2 850
Give and Gain	R 2 440		R 2 440							R 4 131
IDRC	R 5 640 930		R 5 640 930							R 4 137 323
London Mathematical Society	R -									R 78 419
Martin Rees (Endowed Scholarship)	R 85 000		R 85 000							R 85 000
National Skills Fund	R 895 428	R 417 867	R 477 561							R -
Neil Turok	R -									R 12 626
One for Many	R 1 350 926				R 1 350 926					R 308 907
SACEMA (MMED)	R 254 395	R 254 395								R 75 000
Stephen Hawking (Endowed Scholarship)	R 85 000		R 85 000							R 85 000
Sundry Income	R 107 579	R 107 579								R 79 940
The Paul G. Allen Family Foundation (Endowed Scholarship)	R 80 000		R 80 000							R 85 000
University of Bordeaux	R -									R 53 065
Workshops and Conferences	R 921 022	R 921 022								R 700 765
Other Income: Contribution by Projects (Accom.& Admin Fee)	R 3 137 634	R 3 137 634								R 3 136 935
Other Income: Contribution by AIMS-NEI	R -									R 100 000
Other Income: Contribution by Cost Centre: NRF	R 724 483	R 503 003						R 221 480		R 1 010 918
Other Income: Interest Received	R 225 919	R 162 985	R 42 498					R 20 436		R 335 522
TOTAL EXPENSES	R 21 932 676	R 7 077 388	R 5 738 532	R 5 716 863	R 2 873 847	R 187 840	R 155 070	R 183 136	R -	R 21 910 529
Accommodation (General Overhead Levy)	R 2 007 634		R 1 467 099	R 392 445		R 75 100	R 72 990			R 2 116 935
Administration Fees (General Overhead Levy)	R 1 130 000		R 600 000	R 530 000						R 1 020 000
Audit Fee	R 28 853			R 28 853						R 26 961
Affiliation, Registration, Membership and Subscription Fees	R 282 448		R 279 530	R 2 918						R 156 562
Book and periodicals	R 8 716			R 8 716						R 145
Building, Building Refurnish Costs, Equipment & Furniture	R 231 697	R 231 697								R 478 341
Bursaries	R 3 043 847				R 2 873 847			R 170 000		R 3 197 417
Catering	R 3 758 888	R 1 846 365	R 1 467 099	R 312 354		R 72 990	R 60 080			R 3 038 444
Cleaning and Sanitation	R 37 346	R 37 346								R 25 671
Computer Materials	R 78 558	R 78 558								R 91 479
Consultation Fees and Services	R 542 325			R 542 325						R 549 389
Consumable Materials	R 200 862	R 194 307	R 6 555							R 347 311
Copying and Printing	R 44 105	R 44 105								R 57 134
Courses	R 24 400			R 24 400						R 111 400
Flowers and Gifts	R 7 356	R 7 356								R 8 274
Foreign Exchange Loss	R 1 775	R 1 775								R 850
General Office Expenses	R 13 720	R 13 720								R 17 486
General Vehicle Expenditure	R 251 987	R 251 987								R 280 176
Insurance	R 75 750	R 75 750								R 74 050
Internal Transfer of Funds	R -									R 319 400
Internet Expenses	R 539 354	R 171 530	R 155 300	R 190 524			R 22 000			R 441 326
Medical Expenses	R 285 068		R 245 186	R 39 882						R 305 338
Municipal Expenses: Electricity, Rates, Refuse, Water	R 1 338 863	R 1 325 727						R 13 136		R 1 256 636
Photographic Materials	R -									R 2 360
Postage	R 5 650	R 5 650								R 7 778
Remuneration	R 5 572 631	R 2 515 671		R 3 056 960						R 5 291 499
Repairs & Maintenance (Equipment)	R 5 233	R 5 233								R 226 186
Repatriation costs (students)	R -									R 14 945
Security Services	R 14 690	R 14 690								R 16 229
Stationery	R 57 248	R 57 248								R 62 670
Student Stipends	R 883 645		R 843 895			R 39 750				R 739 805
Telephone and Cell Phone Costs	R 74 515	R 74 515								R 65 442
Travel Expenses	R 1 385 512	R 124 159	R 673 868	R 587 484						R 1 563 488
NET INCOME OVER EXPENDITURE	R 760 611	R -1 571 636	R 718 396	R 527 137	R 820 844	R -187 840	R 394 930	R 58 780	R -	R -2 964 547
ACCUMULATED FUNDS AT 1 JANUARY 2013	4 551 883	-1 227 511	836 788	3 738 240	1 134 027	-316 748	20 275	566 612	R -200 400	R 7 516 430
FUNDS AVAILABLE AT 31 DECEMBER 2013	R 5 312 494	R -2 799 147	R 1 555 184	R 4 265 377	R 1 954 871	R -504 588	R 415 205	R 625 392	R -200 400	R 4 551 883

Notes to the financial statement for AIMS South Africa (Cost Centre R028) for the year ended 31 December 2013

These financial statements are official documents of Stellenbosch University who provide financial administration services to AIMS South Africa.

Income

1. Funds received via AIMS-NEI from the IDRC and One for Many, are for 53 structured Masters' student bursaries for the period 1 January to 30 June 2013 (2012/2013 academic year) and for 47 structured Masters' student bursaries for the period 1 July to 30 December 2013 (2013/2014 academic year) plus 30 half-bursaries for post AIMS studies.
2. Grant received from the Department of Higher Education and Training is for the Academic Programme.
3. The funds received from the Department of Science and Technology cover:
 - 3.1 A grant for African tutors and researchers, and postdoctoral fellowships for students from SADC countries
 - 3.2 A contribution to core funding
 - 3.3 A contribution to half-bursaries for post AIMS studies
4. Grant received from the National

- Skills Fund are for 8 South African structured masters' student bursaries
5. Funds received from Friends of AIMS are donations received from visiting lecturers at AIMS South Africa, who have opted to donate their honoraria.
 6. The donations received from Avery Tsui Foundation, Peter Kellner and Neil Turok which have been endowed and called the Stephen Hawking and Martin Rees Endowed Scholarships respectively, provides AIMS South Africa with 2 structured Masters' student bursaries per annum.
 7. An endowed scholarship received from The Paul G. Allen Family Foundation provides AIMS South Africa with 1 structured Masters' student bursary per annum.

Expenses

1. All expenses shown for 2013 refer to actual costs directly attributable to the relevant AIMS South Africa projects, as detailed on the financial statement.
2. Accommodation costs refer to costs for students, lecturers, tutors residing at 6 Melrose Road and

- 16 Watson Street for the duration of the academic year and for visiting researchers residing at 14 Watson Street during the year under review. These costs include: municipal services, repairs and maintenance to buildings and insurance.
3. Administration costs includes general administration and other general expenses of the institution, departmental administration, sponsored projects administration, student administration and services which include affiliation costs, computer materials costs, consumables, general office costs, staff costs, telephone costs etc.
 4. Bursaries and stipendia, staff remuneration, accommodation and meals for students, conferences and visitors, and travel costs (students and lecturers) comprise the largest portion of the expenses.

Balance

As per the Financial Statement for the year ended 31 December 2013, accumulated funds include earmarked funds as listed. Any project shortfalls are taken from existing funds available.

Notes to the financial statement for the AIMS RESEARCH CENTRE (Cost Centre 27798) for the year ended 31 December 2013

1. Accommodation and catering costs refer to costs for visiting researchers, postdoctoral fellows, doctoral and Master' students residing at 14 and 16 Watson Street, Muizenberg, during the year under review.
2. Bursary costs include bursaries paid to postdoctoral fellows, doctoral and Master's students.

3. Medical expenses refer to medical costs for visiting researchers, doctoral and Master's students for the duration of their stay at AIMS.
4. Remuneration costs and consultation fees include salaries for resident and senior researchers, Administrative Officer, part costs for Administrative

and Research Manager, and honorarium stipends to visiting researchers not covered by grant received from the Department of Science and Technology.



AIMS-SA RESEARCH CENTRE (27798)

Financial Statement for the year ended 31 December 2013

	31/12/2013	31/12/2012
Income	R 7 878 988	R 2 636 119
NRF	R 7 800 000	R 2 500 000
Interest received	R 77 209	R 136 057
Foreign Exchange Profit	R 1 779	R 62
Expenses	R 6 638 003	R 4 551 133
Accommodation and Catering	R 31 067	R 113 335
Administrative Fees	R 152 460	R 145 200
Affiliation and Registration Expenses	R 18 240	R 9 290
Bursaries (Postdocs, PhD & MSc)	R 1 115 308	R 967 710
Consultation Fees and Secondments	R 939 474	R 166 576
Consumables	R 76 587	R 113 983
Foreign Exchange Loss	R 2 343	R 23
Furniture & equipment	R 15 734	R 27 037
General Office Expenses	R 43 204	R 44 625
Internet	R 106 414	R 100 672
Medical Expenses	R 71 072	R 63 478
Printing and Stationery	R 139 952	R 91 199
Remuneration	R 2 523 771	R 1 864 020
Rent of premises	R 152 460	R 145 200
Special Events and conferences	R 466 637	R 180 900
Travel Expenses	R 783 280	R 517 885
NET INCOME/(SHORTFALL) OVER EXPENDITURE	R 1 240 985	R -1 915 014
ACCUMULATED FUNDS AT 1 JANUARY 2013	R 1 641 201	R 3 556 215
FUNDS AVAILABLE AT 31 DECEMBER 2013	R 2 882 186	R 1 641 201

SIGNED.....
F. Majiet

F Majiet
Director: Financial Services



AIMSSEC – R268

Financial Statement for the year ended 31 December 2013

	<u>31/12/2013</u>	<u>31/12/2012</u>
INCOME	R 4 087 549	R 4 714 586
Donations		
Comhousing Association	R 19 500	R -
Datatec Education and Technology Trust	R 317 803	R 284 171
False Bay College	R 32 500	R -
Give and Gain	R 43 764	R -
Hamdan Prize (UAE)	R 422 537	R 95 410
Kelelo Consulting	R 5 000	R -
Mondi Limited	R 97 500	R -
Old Mutual Foundation	R 264 543	R 246 790
Rand Merchant Bank Fund	R 500 000	R 500 000
St John's College, Cambridge	R 13 551	R 11 916
Victor Rothschild Memorial Fund	R -	R 319 400
Winton Charitable Foundation	R 106 611	R -
Zenex Foundation	R 60 200	R 559 092
Other income: Sundry	R -	R 6 229
Other income: Sundry cash back	R -	R 14 870
Department of Education: Eastern Cape	R 2 138 920	R 2 578 060
IMSTUS	R -	R 53 348
Foreign Exchange Profit	R 62	R 117
Interest Received	R 65 058	R 45 182
EXPENDITURE	R 4 691 547	R 4 048 738
Bank Costs	R 190	R -
Accommodation and Catering	R 490 571	R 882 396
Advertising	R 33 950	R 30 097
Affiliation and Registration Fees	R 3 400	R 590
Books	R -	R 3 606
Bursaries	R 1 346 295	R 1 186 900
Computer Materials	R 36 137	R -
Consultation Fees and Services	R 9 832	R 33 741
Consumable Materials	R 9 714	R 19 652
Courses	R 2 166	R -
Foreign Exchange Loss	R -	R 307
General Office Expenses (incl. stationery packs)	R 38 651	R 55 248
IT Services (Telematic and course IT)	R 165 117	R 126 833
Medical Expenses	R 9 087	R -
Postage	R 7 780	R 33 460
Remuneration	R 1 562 391	R 807 771
Rent of Rooms	R 17 130	R 66 795
Services	R 59 182	R 59 471
Smaller Furniture and Equipment	R 52 408	R -
Travel Expenses	R 847 545	R 741 872
NET (SHORTFALL)/INCOME OVER EXPENDITURE	R -603 998	R 665 848
ACCUMULATED FUNDS AT 1 JANUARY 2013	R 1 728 516	R 1 062 668
FUNDS AVAILABLE AT 31 DECEMBER 2013	R 1 124 518	R 1 728 516

SIGNED: *F. Majiet*
 Ms F Majiet
 Director: Financial Services

supporters

AIMS South Africa donors

Africa-America Mathematics Initiative
Alan Kay
AMMSI – African Mathematics Millennium Science Initiative
Andrew Mellon Foundation
Anglo American Chairman's Fund
Arcadia/ Charity Aid Foundation
Avery Tsui Foundation
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CSIR – Council for Scientific and Industrial Research
Cynthia & George Mitchell Family Foundation
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Department of Science and Technology (DST, Government of South Africa)
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Fondation Philanthropia
Ford Foundation
Fred Turok
Gatsby Charitable Foundation
Go Open Source Campaign
Google Inc. Charitable Giving Fund of Tides Foundation
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Hand Drum Rhythms, Victoria BC
Harold Hyam Wingate Foundation
Hyper-Interactive Teaching Technology
ICSU - International Council for Science
Institut des Hautes Etudes Technologiques
Institute of Physics
International Council for Industrial and Applied Mathematics
International Union for Pure and Applied Physics
International Union of Theoretical and Applied Mechanics
Isle of Man Overseas Aid committee
iThemba Labs
James-Clerk-Maxwell-AIMS Fund
Jussi Westergren
London Mathematical Society
Muizenberg Millennium Education Trust
National Research Foundation (NRF)
National Skills Fund (DHET, South Africa)
Neil Turok
New Star Investment Trust
Nokia

One for Many Scholarship Programme
- Research in Motion
- Simon Fraser University
- University of British Columbia
- University of Guelph
- University of Ottawa
- University of Paris Sud
- University of Victoria
- University of Waterloo
Paul G Allen Family Foundation
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PetroSA
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Seardel Investment Corporation Ltd
Sheridan Lorenz
Stellenbosch University
SUN Microsystems
Sunday Times
TENET – Tertiary Education and Research Network of South Africa
Université Paris-Sud XI
University of Cambridge
University of Cape Town
University of Oxford
University of the Western Cape
University of Illinois at Urbana-Champaign (Depts of Mathematics, Physics and the Graduate College)
US Fulbright Specialist Programme
Victor Rothschild Memorial Fund
Vodacom Foundation
Vodafone Group Foundation
Wong-Avery
AIMS gratefully acknowledges the smaller donations and gifts of books received, as well as the contributions of visiting lecturers who waived their honoraria.

AIMSSEC is grateful to its sponsors for supporting its programmes.

The following sponsors donated more than R30 000:

Alex Sainsbury
Comhousing Association
Datatec Educational and Technology Trust
Department of Higher Education and Training
Department of Education: Eastern Cape
Department of Education: Western Cape, Metro South District
European Union
False Bay College
Focus on Primary Maths Group
Mondi Limited
Newcastle University (FaSMEd)
Nuffield Foundation
Rand Merchant Bank Fund
Old Mutual Foundation
UNESCO Hamdan Award
Victor Rothschild Memorial Fund
Winton Charitable Foundation



AIMS

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