



AIMS
SOUTH AFRICA



ANNUAL REPORT 2013

About us

This is the annual report of the African Institute for Mathematical Sciences South Africa (AIMS-SA) for the period 1 August 2012 to 31 July 2013. It includes an overview of all activities of AIMS-SA and its associated projects, as well as the financial statements for the 2012 calendar year.

AIMS-SA is a partnership project between the following local and international universities: University of Cambridge, University of Cape Town, University of Oxford, Université de Paris Sud X1, Stellenbosch University and the University of the Western Cape.

This year we celebrated our 10th anniversary and since the institute opened in 2003, 470 students have graduated (including 149 women), from 35 different African countries.

The goals of AIMS are:

- To promote mathematics and science in Africa
- To recruit and train talented students and teachers
- To build capacity for African initiatives in education, research and technology

Contents

1. Foreword by the Director
2. Academic Programmes
14. AIMS Research Centre
20. AIMS Schools Enrichment Centre (AIMSSEC)
22. Workshops and Conferences
24. Outreach, meetings and joint initiatives
26. The AIMS Network
27. Visitors
29. Governance and Administration
32. Financial Reports
- IBC Supporters



Foreword by the Director



In his address at the AIMS Graduation Ceremony in June 2006, Chris Brink, Vice Chancellor of the University of Stellenbosch, quoted Lewis Carrol, saying “what I tell you three times is true.” In 2006 AIMS was celebrating its third graduation ceremony and all involved were beginning to believe it was real and would last. AIMS was proving itself to be an excellent innovative model for training and outreach in the mathematical sciences and had the credentials to become a South African and Pan-African Centre of Excellence as it grew.

This year we celebrated our tenth anniversary, and it is fair to say that AIMS-SA has far exceeded the expectations and dreams of its founding group and supporters. It has graduated 470 students, 149 of whom are women, 55 have continued to obtain PhDs, 233 research Master’s, and over 300 are still in Africa. Among them 77 are lecturing and teaching in Africa, 17 in South Africa, and over 50 are working in industry. One hundred and fifty-four academics have offered courses at AIMS and our young Research Centre has attracted over 500 visiting scientists. The AIMS Schools Enrichment Centre (AIMSSEC) has offered professional development programmes to more than 1000 teachers from rural South African schools and is recognised for the impact it is making.

AIMS has been acknowledged and supported by members of the South African Government, by African Presidents, European and North American Governments, the Mathematical Sciences Community, large and small organisations and donors. Together, all have contributed to make it a leading example for scientific growth and development enabling Africa’s talented young graduates to contribute to the continent’s growth together, as part of a new dynamic network. This success can be measured by the progress of its alumni, and also by the strong support it has received from African academics and governments to establish similar centre’s across the continent first in Sénégal, then in Ghana and now in Cameroon. Now we can say more boldly, “AIMS has been replicated three times and is a real African Network” (while fully aware of the challenge this poses). South Africa and all involved proudly share this achievement.

A highlight of the past academic year was the graduation of the first January intake of nine South African students who registered in 2012. AIMS now has two intakes each year, one in August more suited to the academic calendar outside South Africa, while the January intake accommodates South African students. Both groups follow the same programme and attend many courses together. Another highlight was the conversion of the AIMS Postgraduate Diploma to a structured coursework Master’s degree in the mathematical sciences. The 2012 – 2013 group of students were the first to follow this upgraded programme and 49 of them graduated with this qualification in June 2013. While maintaining the unique innovative character of our programme, this positive change will give greater recognition and value to the course offered and bring it in line with the qualification now being awarded at the new AIMS centres in Sénégal and Ghana.

Internationally 2013 has been designated the Mathematics of Planet Earth Year (MPE2013) emphasising the diverse role mathematics plays in scientific and human activity. AIMS has been a participating institute and a number of special workshops and events were aligned to this theme. The MPE2013 Simons Foundation Public Lecture presented by AIMS, was one of a series of special lectures by leading experts held at nine international locations. It was an honour for AIMS to be selected to host this event. The speaker was Professor Inez Fung, from the University of California in Berkeley, who spoke on Climate Math.

In 2012/2013 AIMS also participated in the German-South African Year of Science. An instructional workshop on Discrete Geometry and Visualisation was presented at AIMS by members of the Berlin Mathematical School. Other special events included a TEDxAIMS talk and a SuperJEDI Cosmology Workshop organised in Mauritius by Professor Bruce Bassett from our Research Centre. The Cosmology Group of the AIMS Research Centre was also strengthened with two excellent new appointments at the beginning of 2013. Professor Romeel Davé was appointed to a joint AIMS-SAAO-UWC Research Chair and Professor Martin Kuntz, from the University of Geneva, who is an SKA Visiting Professor and is spending three to four months at AIMS each year from 2013 to 2015. AIMS continues to receive generous support from the

South African Departments of Higher Education and Training and Science and Technology. In May 2013 the National Skills Fund of the Department of Higher Education and Training approved a substantial grant to AIMS for its Schools Enrichment Centre and for bursaries for South African students following the Master's programme. We gratefully acknowledge this support and look forward to the programmes it will make possible.

The 2012/2013 year culminated in the 10-year Anniversary Celebration and the first AIMS-NEI Global Alumni Reunion for alumni from all AIMS centres. This was a moving occasion, attended by many of our friends and committed supporters. These included Minister Naledi Pando, representatives of the South African Department of Science and Technology, Professor Ben Turok, Professor Neil Turok, members of the Canadian International Development Research Centre (IDRC), members of the German Embassy in South Africa, the

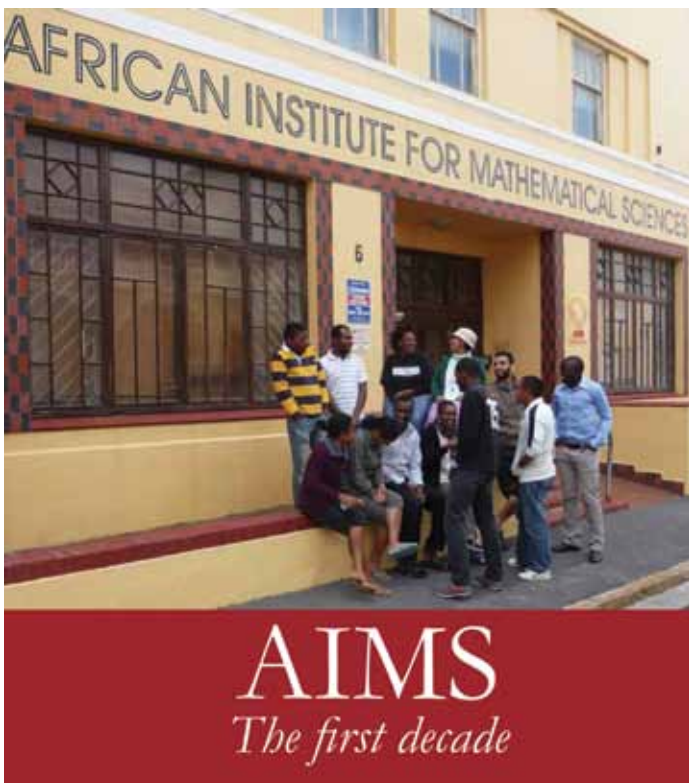
Alexander von Humboldt Foundation, German Academic Exchange Service (DAAD) and the Robert Bosch Foundation.

At this occasion, we launched a book on the history of AIMS with the title *AIMS: the first decade*. This book, which was kindly compiled by Alan Beardon, presents the reflections of many people who have been involved in the AIMS project. It includes personal memories and feelings about the growth and success of AIMS and reflects a spirit of optimism and the first steps towards building similar centres across Africa.

It is a pleasure to thank the AIMS staff, whose commitment and enthusiasm was essential to the success of activities at AIMS in 2012/2013.



Director, Barry Green



Academic programmes

During this year, AIMS-SA consolidated and expanded its academic programmes. The Postgraduate Diploma in Mathematical Sciences (PGD), which was AIMS' flagship programme, has now been converted to a structured Master's with two intakes a year, August and January. We have also continued with our joint undergraduate honours courses in Biomathematics and Financial Mathematics.

Postgraduate Diploma in Mathematical Sciences (January 2012 intake)

The August commencement of our main programme, whilst suiting most of Africa, has not meshed well with the South African academic year. As a result, the main programme has not attracted the expected quota of South African students. For this reason a second stream was introduced in January 2012 with nine students, from the Universities of Limpopo, Venda, the Witwatersrand and the Western Cape. The final three courses held in this reporting period were Complex Analysis with Applications (Florian Breuer, Stellenbosch), Concepts in Physics and Physical Problem Solving (Fritz Hahne, Stellenbosch) and Probability and Statistics (David Spiegelhalter, Cambridge). All the students completed the programme in December 2012. Four of them are pursuing a Master's degree by research at AIMS.

Master's in Mathematical Sciences (August 2012 intake)

The distinctive innovative character of the programme has been maintained but the length of the research dissertation doubled. This change provides greater recognition and value to our course and also brings it in line with the qualifications now being offered at the AIMS centres in Sénégal and Ghana. The programme continues each year to attract hundreds of applications from all over Africa. 52 students from 21 countries were enrolled in the programme during the 2012 academic year and 49 successfully completed the Master's in June 2013. The remaining three are expected to graduate in December 2013.

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 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, and business and entrepreneurial skills.



Jeff Sanders, Academic Director

The elective "review" courses introduce students to cutting-edge topics in the mathematical sciences, lectured by international experts. The AIMS model allows our selection of review courses to respond to the availability of exceptional lecturers and to respond to new important topics. It incorporates continuing assessment to allow students to focus on the acquisition of research skills. It included specialised guest lecturers and team entrepreneurial projects evaluated by a panel of experts. A feature of the programme this year was a fully-fledged SEED (Skills for Employability, Entrepreneurship and Development) course, mounted by Arun Sharma of AIMS-NEI, on business-related and entrepreneurial skills.

In the final phase, each student undertakes a research project on a topic proposed and supervised (mostly) by local academics. Students present and discuss their research with a panel of external examiners which this year included: Professor David Aschman (University of Cape Town), Dr Alan Cornell (University of the Witwatersrand), Professor Tertius de Wet (Stellenbosch University), Associate Professor Christopher Gilmour (University of Cape Town), Extraordinary Professor Dirk Laurie (Stellenbosch University), Professor Kailash Patidar (University of the Western Cape) and Professor Mamadou Sango (University of Pretoria). Study breaks allow students the opportunity to consolidate, and to benefit from attending specialised workshops which this year have included geometrical visualisation, geometry and manifolds and financial mathematics.

Master's in Mathematical Sciences (January 2013 intake)

Eight students registered for the second stream now upgraded, like its sister programme, to Master's level. However, one student was unable to continue with the course due to personal circumstances.

January 2013 intake

Students	Gender	Country	Previous Institution
Michael Benjamin Cromberge	M	South Africa	Witwatersrand
Masingita Errol Manganyi	M	South Africa	Venda
Ndivhuwo Mphephu	M	South Africa	Venda
Phumlani Mzazi	M	South Africa	Cape Town
Qondisa Ngxanga	F	South Africa	Western Cape
Matthews Malebogo Sejeso	M	South Africa	Witwatersrand
Moustapha Abakar Ousman	M	Chad	Adam Barker, Chad



Combined Courses

Period	Lecturer	Course	Intake	
			MSc Aug '13	MSc Jan '13
13 Aug – 2 Nov '12	Jan Groenewald, AIMS	Computing and LaTeX	x	
	Frances Aron, AIMS	English Essentials and Communication Skills	x	
27 Aug – 14 Sept '12	Fritz Hahne, Stellenbosch	Concepts in Physics and Physical Problem Solving	x	
	Juan Antonio Rodriguez-Aguilar, Spanish National Research Council	Scientific Computing with Python and SciPy	x	
17 Sept – 5 Oct '12	Alan Beardon, Cambridge	Mathematical Problem Solving	x	
	David Spielgelhalter, Cambridge	Probability and Statistics	x	
8 Oct – 12 Oct '12	Jan Groenewald and Frances Aron, AIMS	The Scientific Environment	x	
15 Oct – 2 Nov '12	Marcin Kostur, Silesia	Experimental Mathematics with SAGE	x	
	Kesh Govinder, KwaZulu-Natal	Differential Equations	x	
22 Oct – 2 Nov '12	Arun Sharma, AIMS-NEI	SEED – Skills for Employability, Entrepreneurship and Development	x	
12 – 30 Nov '12	David Bekolle, Ngaoundere	Real and Complex Analysis	x	
	Bernd Schroers, Herriot-Watt	Finite Dimensional Quantum Mechanics and Quantum Computing	x	
	Robert de Mello Koch, Witwatersrand	Electromagnetism	x	
3 – 21 Dec '12	Gabriel Lord, Herriot-Watt	Numerical Analysis	x	
	Stephan Wagner, Stellenbosch	Combinatorics	x	
	Rob Beezer, Puget Sound	Topics in Algebraic Graph Theory	x	
7– 25 Jan '13	Steve Bradlow, Illinois	Curves	x	
	Stephane Ouvry, Paris Sud XI	Statistical Physics	x	
	David Stern and Tom Denton, Maseno	Mathematical Problem Solving		x
	Emile Chimusa, AIMS	Computing Skills (LaTeX, Python and SAGE)		x
	Frances Aron, AIMS	Communication Skills		x
9 – 18 Jan '13		Mathematics in Industry Workshop	x	
28 Jan – 15 Feb '13	Patrick Dorey, Durham	Solitons	x	x
	Marcin Kaminski, Libre de Bruxelles	Algorithmic Graph Theory	x	x
	Wilson Lamb, Strathclyde	Applying Functional Analytic Methods to Evolution Equations	x	x
	Emile Chimusa, AIMS	Computing Skills (LaTeX, Python and SAGE)		x
	Frances Aron, AIMS	Communication Skills		x
11 Feb – 22 Feb '13	Pedro Meseguer, CSIC (Spain)	Heuristic Search with Python		x
25 Feb – 15 Mar '13	Wolfram Dekker and Gerhard Pfister, Kaiserslautern	Computational Algebra	x	x
	Rafael Nepomechie, Miami	Quantum Mechanics	x	x
	Bill Noble, Washington	Introduction to Bioinformatics	x	x
18 Mar – 22 Mar '13	Graham Richards, Oxford	Creating Businesses from Research	x	x
18 Mar – 5 Apr '13	Dan Jacobson, Stellenbosch	Computational Biology	x	x
	Florian Rupp, München	Applied Ito Stochastic Differential Equations in Population Biology & Sociology	x	x
	Natasha Govender CSIR & Jeff Sanders, AIMS	Intelligent Systems and Algorithms	x	x
15 Apr – 3 May '13	Kablan Jerome Adou, Cocody	Geophysical Fluids Modelling		x
	Lafras Uys, AIMS	Systems Biology		x
6 – 24 May '13	Raouf Ghomrasni, AIMS	Financial Mathematics		x
	Paul Taylor, New Jersey, AIMS	Biomedical Signal Processing		x
27 May – 14 Jun '13	Juliet Pulliam, Fogarty	Mathematical Modelling in Medicine and Public Health		x
	Johan de Villiers, Stellenbosch/AIMS	Mathematics of Approximation		x

Professor Rob Beezer, lecturer

Rob Beezer is a professor at the University of Puget Sound in Tacoma, Washington, USA, where he has taught since receiving his PhD in 1984 from the University of Illinois at Urbana-Champaign. His mathematical interests centre on algebraic graph theory, which combines graph theory, linear algebra, group theory, and broader topics in combinatorics. For the past decade, he has been a leader in creating and promoting textbooks with open licenses, such as his freely available textbook, *A First Course in Linear Algebra*.

He was initially attracted to AIMS due to his work as a contributor to the open-source mathematical software system, SAGE, which is used extensively in the Master's programme. Outside of academic interests, he enjoys cycling, swimming, wildlife photography in southern Africa, and hiking up Muizenberg Peak.

"The opportunity to teach intensively at postgraduate level, with an emphasis on an experimental approach to algebra

and combinatorics, first interested me in teaching at AIMS.

However, living and working closely with students and tutors from many different countries has been a wonderful experience that has kept me coming back to teach subsequent courses. It is

inspiring to work directly with the next generation of African mathematicians, and to think that the work at AIMS, both in South Africa, and at the new centres, can spread to a much greater population of students throughout the continent. AIMS' flexible approach and collegial atmosphere, together with motivated students, makes teaching here a delight."



Professor David Bekolle, lecturer

Professor David Bekolle is originally from the Department of Mathematics of the Faculty of Science at the University of Yaounde I. Since 2005, he has been appointed vice-rector at the University of Ngaoundere, where until very recently, he also acted as the Head of Department of Mathematics and Computer Science of the Faculty of Science. His research area is Classical Analysis, particularly regularity properties of singular operators on real and complex domains. He is also involved in the development of training and research in Mathematical Epidemiology in Central Africa. Professor Bekolle delivered a review course at AIMS-SA in November 2012 on the theme "Topics on Real and Complex Analysis".

"The AIMS initiative is so admirable and far-reaching. What a remarkable achievement to bring together outstanding students from across Africa and to offer them the opportunity of being trained by renowned international

lecturers and researchers. The subjects are topical and most of them come as a discovery for the students and open their minds to the scientific world. I enjoyed working with the highly motivated students especially the top-class women students. The

location of AIMS-SA is magical and the atmosphere on its campus is extremely stimulating."

Professor Bekolle was also a member of a review panel of AIMS-SA in 2011 and is involved in the launching of AIMS-Cameroon.



Musa Baloyi, PGD student

Musa Kurhula Baloyi graduated with a bachelor's degree in Computer Science and Statistics from the University of Limpopo in 2008. In 2009, he got into the IBM Graduate Programme where he worked as an IT Specialist. During his second year with IBM, he was a Technical Consultant in the Information Management space but mostly DB2. He registered for a Higher Diploma in Computer Science with Wits University in 2010 while working at IBM's Africa Innovation Centre. The year 2011 saw him studying full-time to attain an Honours degree in Computer Science. An opportunity at AIMS enabled him to pursue a Postgraduate Diploma in Mathematical Sciences, with a thesis in Mathematical Finance. As of April 2013, he is a Software Developer at ThoughtWorks' Braamfontein offices.

"I came to AIMS for two reasons. The first is that I wanted to do Mathematics of Finance but not at honours level since I already had an honours degree. The second was that

AIMS offered a range of courses in mathematical sciences which I had been meaning to study. The scholarship package allowed me to achieve both these things. Being in a different city and working with students from all over Africa and lecturers from all over the world was just the

cherry on top. The main goal was to study Mathematical Finance so I could better develop financial software. AIMS helped me a lot in that it provided me with the opportunity to work with Professor Jeff Sanders (a theoretical computer scientist) and Professor Raouf Ghomrasni (a financial mathematician) who gave me my first exposure to working with financial formulae and computer algorithms."



Profiles

Fumilayo Eniola Kazeem, Master's student

Fumilayo Eniola Kazeem from Nigeria was born into a family of four children, where she is the eldest. During her years of schooling in Nigeria she dreamt of leaving her country to see what the world out there really looked like. "I learnt of AIMS from my lecturer (Dr (Mrs) Olubunmi Fadipe-Joseph) after I had finished my university education. She told me she had been to AIMS and she really liked the way in which they do things there and of course, everything was free. She encouraged me to apply and I did. Life at AIMS was exciting for me because I never knew what to expect from the many courses we did. I was still a beginner in computing so the classes were fun for me. AIMS gave me the opportunity to go abroad for the first time and to meet new people including some important people we only watch on TV. The whole experience was quite challenging and exciting at the same time as I always had to think and speak smartly." She is currently enrolled at the University of the Western

Cape for a Master's in Computational Finance and would like to pursue her PhD afterwards.

"What AIMS is doing is an amazing thing, clever students from disadvantaged backgrounds are helped to reach their dreams and give back to their families in one way or the other. I never really quite knew the extent to which AIMS has reached until I saw the AIMS alumni that were present at the recently concluded Global Alumni Reunion. I would therefore like to encourage all alumni to help someone out there to reach his/her dream in the spirit of AIMS and to let everyone out there know what AIMS is doing and also help raise funds for future AIMS students."



Mark Masonda Webster Shawa, Master's student

Mark Shawa attended a boarding school at the age of seven in a rural part of Zimbabwe. Ever since, he has been independent from his parents. "My love for science came much later at the age of thirteen when I read a book about Sir Isaac Newton. His life story has had a huge influence on how I think about science and that is, 'I may not be a genius but that shouldn't stop me from trying to do great things.' After that I became deeply interested in mathematics and physics and later went to study Physics at the University of Zambia."

"When I first heard about the Next Einstein Initiative, I was intrigued by the idea that there existed an institute in Africa (AIMS) that, from my perspective, promoted genuine creativity and vision.

During my stay at AIMS I met many people from different corners of the planet and got an idea of what it means to be an academic, particularly the attitude required to be a leading mathematician or physicist. My time at AIMS helped me become a more focused thinker in almost every faculty of my life. The knowledge I acquired only made me hungrier for more knowledge and it's for this very reason, I believe, I may be able to solve problems and in general do great things with my life. I will continue my studies in South Africa and hope that someday I'll inspire young people to have the vision I was given at AIMS."



Research Project Phase

During the third semester, students do a research project on a topic which they select from a list proposed by local academics. This provides an introduction to the research skills necessary for specialisation, as well as to topics which

could become the focus of further studies. Ten students were supervised by researchers and postdoctoral fellows based in the AIMS Research Centre. A full list of the essay topics is included below and on page 7.

January 2012 intake

Student	Gender	Title	Supervisors	University Affiliation
Valrie Mabu Serumula	F	Assessing methods to determine date of admixture in a multiway admixed populations	N Mulder	Cape Town
Musa Kurhula Baloyi	M	Take care of the cents and the rands will take care of themselves	J Sanders & R Ghomrasni	AIMS-SA
Raabia Walljee	F	Pricing a zero recovery credit-risky zero-coupon bond when interest rates are geometric mean-reverting	S Mataramvura	Cape Town
Hellen Thabo Mogashoa	F	Multivariate Statistic: Application of log-ratio and Biplots analysis to Archaeological Artefacts Data	S Lubbe	Cape Town
Vuyokazi Patience Ndlebe	F	Pricing fixed-strike Asian call options when prices are mean-reverting	S Mataramvura	Cape Town
Phumza Thafeni	F	Pricing of American Option	M Capinski	Warsaw
Lesiba Charles Galane	M	The Black-Litterman Methodology to Portfolio Management	R Ghomrasni	AIMS-SA
Nakedi Wilson Leboho	M	The Relationship Between Risk and Return as Explained by the Capital Asset Pricing Model and the Three Factor Model	R Becker	AIMS-SA
Isia Tebogo Dintoe	M	On Some Characterisation of Reflexivity	J Sanders	AIMS-SA

August 2013 intake

Students	Gender	Origin	Title	Supervisors	University Affiliation
Ali Mshindo Bakar	M	Tanzania	Local Features for American Sign Language (ASL) Recognition	M H E Wafy	Helwan, Egypt
Alton Vanie Kesselly	M	Liberia	Chameleon Field Theories and Fifth Forces	A Weltman	Cape Town
Amro Ismail Abdelgalil Mohamed Khair	M	Sudan	Orlicz Spaces, Love-Young inequalities and the generalization of the Riemann-Stieltjes Integral	R M Lochowski	Warsaw
Andriniaina Narindra Rasoanaivo	M	Madagascar	Expectation Value of the Quantum Stress-Energy Tensor-Using the Keldysh Formalism	W A Horowitz	Cape Town
Anne Akoth Misere	F	Kenya	Radon levels in homes-sources, measurements, modelling and health risk	R T Newman	Stellenbosch
Asres Wage Fite	F	Ethiopia	Analysis of a malaria model that includes Treatment and Vaccination with waning immunity	R Ouifki	SACEMA
Ayman Ali Adm Omer	M	Sudan	System identification of a robotic arm	A Liddiard	CSIR Meraka Institute
Carine Umulisa	F	Rwanda	A Robust Model of Genome-Wide Meta-analysis towards identifying disease predisposing	R S Ramesar	Cape Town
Chacha Marwa Issarow	M	Tanzania	Population genetics models of local ancestry inference	N Mulder	Cape Town
Chinedu Christian Ahia	M	Nigeria	Design criteria for semiconductor quantum dots	J R Botha	NMMU
David Mwale	M	Zambia	Bounding the Average Distance of a Graph by Minimum Degree, Girth and Total Weight	D Erwin	Cape Town
Domilongo Christian Bope	M	DRC	Ancestry Informative Panels and Unusual Population differentiation in the Indigenous Southern African Populations	R S Ramesar	Cape Town
Dominic Makaa Kitavi	M	Kenya	Numerical Solution of the Korteweg-de Vries (KdV) Equation	R Appadu & N S Nguetchue	Pretoria
Donnie Munyao Kasyoki	M	Kenya	Character Degree Graphs of Finite Groups	H P Tong-Viet	KwaZulu-Natal
Efa Aso Amoh-Barimah	F	Ghana	Modelling Substance Abuse with a Saturated Rehabilitation Function.	F Nyabadza	Stellenbosch
Emmanuel Tuyishimire	M	Rwanda	Routing in Mobile Networks	J Sanders	AIMS-SA
Francis Mponda	M	Malawi	A Study on Iterative Methods for Algebraic Linear Systems	M Ali	Witwatersrand
Funmilayo Eniola Kazeem	F	Nigeria	An Introduction to Large Deviations with Applications in Mathematical Finance	R Ghomrasni	AIMS-SA
Gael Mboussa Anga	M	R Congo	Indifference pricing in a one-period incomplete binomial model	R Ghomrasni	AIMS-SA
Gcina Mafukazi Maziya	M	Swaziland	A one-dimensional model for the vapour-to-liquid phase transition	M Kastner	NITheP
Hagos Hailu Gidey	M	Ethiopia	Time-Splitting procedures for the numerical solution of the 2-D Advection-Diffusion Equation	R Appadu	Pretoria
Ibrahim Ahmed Abdellah Ahmed	M	Egypt	Density Functional Theory on a Lattice	D Joubert	Witwatersrand
Jacquiline Wangui Mugo	F	Kenya	Modelling disease-risk prediction and heritability rate using Genome-wide Association Studies	N Mulder	Cape Town
Jeffrey Ted Johnnatan Mbongo Nkouna	M	R Congo	Modelling the term structure of interest rates: the binomial approach	R Ghomrasni	AIMSSA
Jummy Funke David	F	Nigeria	A Model for Analysis of Drug Abuse and HIV Infection	F Chirove	KwaZulu-Natal
Khaphetsi Joseph Mahasa	M	Lesotho	Dating Distinct Admixture Events in Multi-way Admixed Populations: Application in comparing genetic make-up of South African Coloured and Maghrebi populations	N Mulder	Cape Town
Koffi Messan Agbavon	M	Togo	Mathematical modelling of cancer self-remission and tumour instability as a prey-predator system	H M Mambili	Pretoria
Maha Mohamed	F	Sudan	Modelling the stellar populations of galaxies	G Kauffmann & R Dave	Max Planck/AIMS-SA
Marie Yvonne Uwera	F	Rwanda	Exploring the potential of photovoltaics as an emerging technology in South Africa	B Sebitosi	Stellenbosch
Mark Musonda Webster Shawa	M	Zambia	Dissipative Quantum Computing using the Open Quantum Walk	F Petruccione	KwaZulu-Natal
Mirette Magdy Abdelmageed Fawzy	F	Egypt	Low-Dimensional Electron Transport	M Blumenthal	Cape Town
Mogale Enos Mphahlele	M	South Africa	Numerical Methods for the control of conservation laws	M Banda	Stellenbosch
Mpumelelo Mduzuzi Matse	M	Swaziland	Active filaments in narrow channels	K Muller-Nedebock	Stellenbosch
Mustafa Abaas Mohamedelkhair Ahmed	M	Sudan	Muon Detection in ALICE	Z Buthelezi & F Bossu	iThemba Labs
Myriam Mahaman	F	Madagascar	Galois Representations Attached to Elliptic curves	F Breuer	Stellenbosch
Nadine Tchamba Yimga	F	Cameroon	Zinc Oxide Piezoelectric Nanogenerators	W J Perold	Stellenbosch
Nephtale Bvalamanja Mumba	M	Malawi	Codes and graphs from alternating groups A_n for n odd	E Mwambene & B Rodrigues	Western Cape/ KwaZulu-Natal
Olajumoke Yetunde Fashomi	F	Nigeria	On the comparison between Picard's iteration method and Adomian Decomposition method in solving nonlinear differential equations	S S Motsa	KwaZulu-Natal
Oluwafisayo Yewande Omikunle	F	Nigeria	Measuring Disease Similarity and Retrieving Disease-Related Candidate Genes using Gene Ontology	G K Mazandu	Cape Town
Oteng Maphane	M	Botswana	Introduction to fuzzy set theory and topology	W Kotze	Rhodes
Princess Chidinma Anusionwu	F	Nigeria	Modelling of Shielding Associated with Neutron Generators	RT Newman	Stellenbosch
Rasha Abbas Ahmed ElAmeen Ehaimer	F	Sudan	Circular Polarization	E G Rohwer & P Neethling	Stellenbosch
Richard Junganiko Munthali	M	Malawi	Assessment of Genetic Disease Scoring Statistics in Multi-way Admixed Populations	N Mulder	Cape Town
Simachew Endale Ashebir	M	Ethiopia	Density Functional Theory: Excited States of Two Particle Systems	D Joubert	Witwatersrand
Sobhy Elsayed Mohammed Elmahdy Lofty	M	Egypt	Second Harmonic Generation	E G Rohwer	Stellenbosch
Tanjona Fiononana Ralaivaosaona Kholaif	F	Madagascar	Steganography	J Sanders	AIMS-SA
Tina Ambinintsoa Malalanirainy Rakotoson	F	Madagascar	Wavelets and Biomedical Signals	P A Taylor	AIMS-SA
Titus Okello Orwa	M	Kenya	A 'tik'-abuse model with a non-linear initiation function	F Nyabadza	Stellenbosch
Valisoa Razanajatovo Misanantenaina	F	Madagascar	The Energy of a Graph	S Wagner & E O D Andriantiana	Stellenbosch
Vernon Maluba J Chisapi	M	Zambia	Treatment Planning Process In External Beam Radiation Therapy of Cancer	B Jeremic	Stellenbosch
Woinshet Defar Mergia	F	Ethiopia	Discontinuous Galerkin methods for the solution of a class of hyperbolic problems	J Tchoukouegno Ngnotchouye	KwaZulu-Natal
Yae Olatoundji Kowowale U Gaba	M	Benin	Maximum Principles	J Banasiak	KwaZulu-Natal

Graduations

On 30 November, a recognition of achievement ceremony was held for the nine South African students of the January 2012 intake of the Postgraduate Diploma. The guest speaker was Ms Nasima Badsha, Chief Executive Officer, Cape Higher Education Consortium, who also handed out the certificates to the students. The ceremony was followed by a special lunch. Students officially graduated at their respective universities in 2013.



At a special ceremony on 26 June 2013, 49 students from the August 2012 intake graduated with the Master's in Mathematical Sciences. The ceremony was officiated by Dr Max Price, Vice-Chancellor, University of Cape Town, Professor Michael-Davies Coleman, Dean of Natural Sciences, University of the Western Cape and Professor Eugene Cloete, Vice-Rector Research, Stellenbosch University. The opening speech was given by Professor Neil Turok, Founder of AIMS and Board Chair and the main speaker was Dr Loyiso Nongxa (former Vice-Chancellor, University of the Witwatersrand).



In the ceremony, AIMS Endowed Scholarships were awarded to a number of top achievers: Mr Adriniana Narindra Rasoanaivo, who received the Stephen Hawking Scholarship, Ms Myriam Mahaman who received the Martin Rees Scholarship, Ms Tanjona Fiononana Ralaivasaona who received the Paul G Allen Scholarship, and Mr Mark Musonda Shawa who received the Victor Rothschild Scholarship. Ms Valisoa Razanajatovo Misanantenaina, was the recipient of a Special Achievement Award.

This year a special choir composed of AIMS students and conducted by Professor Johan de Villiers of the AIMS Research Centre gave a sterling performance as part of the festivities.



Extramural activities

In the course of the year, students also attended various extramural activities and outings. These included:

- Heritage Day, a public holiday celebrated in South Africa on 24 September. AIMS joined in the celebrations by having a braai (barbeque) on Friday 21 September. There was also free entry at all Iziko Museums on the day and students made good use of the opportunity by visiting the Castle of Good Hope and the South African Museum in Cape Town.
- Professor Bernd Schroers arranged two hikes for the students. On Saturday 1 December, the students walked from Muizenberg to the Amphitheatre and St James Peak. On the Sunday, students hiked to Table Mountain starting from AIMS at 5.30am. The hikers passed Constantia Nek on the way, and then went on to Cape Town.
- On 15 February, students together with lecturer Patrick Dorey, celebrated the end of a lecture block by going hiking. The walk was from AIMS to Silvermine.
- On Thursday 30 May, the students went on an outing to the World of Birds in Hout Bay followed by a scenic drive along the coast for a view of Green Point Stadium.



Progress of students after AIMS

Students	Gender	Country of Origin	Institution/ University	Programme
Graduates from January 2012 intake				
Hellen Thabo Mogashoa	F	South Africa	National Research Foundation	Tutor
Isia Tebogo Dintoe	M	South Africa	Witwatersrand	Research Master's
Lesiba Charles Galane	M	South Africa	AIMS-SA/Stellenbosch	Research Master's
Musa Kurhula Baloyi	M	South Africa	Industry	
Nakedi Wilson Leboho	M	South Africa	AIMS-SA/Stellenbosch	Research Master's
Phumza Thafeni	F	South Africa	AIMS-SA/Stellenbosch	Research Master's
Raabia Walljee	F	South Africa	AIMS-SA/Stellenbosch	Research Master's
Valrie Mabu Serumela	F	South Africa	Cape Town	Research Master's
Vuyokazi Patience Ndlebe	F	South Africa	Industry	
Graduates from August 2012 intake				
Ali Mshindo Bakar	M	Tanzania	Pursuing other opportunities	
Alton Vanie Kesselly	M	Liberia	Cape Town	Research Master's
Amro Ismail Abdelgalil Mohamed Khair	M	Sudan	Pursuing other opportunities	
Andrinaiaina Narindra Rasoa Rasoanaivo	M	Madagascar	Perimeter Institute	Research Master's
Anne Akoth Misere	F	Kenya	Stellenbosch	Research Master's
Asres Wage Fite	F	Ethiopia	Pursuing other opportunities	
Ayman Ali Adm Omer	M	Sudan	International University of Africa	Lecturer
Carine Umulisa	F	Rwanda	Cape Town	Research Master's
Chacha Marwa Issarow	M	Tanzania	Cape Town	PhD
Chinedu Christian Ahia	M	Nigeria	Nelson Mandela Metropolitan	PhD
David Mwale	M	Zambia	University of Zambia	Research Master's
Domilongo Christian Bope	M	DRC	Singapore	PhD
Dominic Makaa Kitavi	M	Kenya	Pursuing other opportunities	
Donnie Munyaio Kasyoki	M	Kenya	Pursuing other opportunities	
Efia Aso Amoh-Barimah	F	Ghana	Stellenbosch	Research Master's
Emmanuel Tuyishimire	M	Rwanda	Cape Town	Research Master's
Francis Mponda	M	Malawi	Pursuing other opportunities	
Funmilayo Eniola Kazeem	F	Nigeria	Western Cape	Research Master's
Gael Mboussa-Anga	M	R Congo	Stellenbosch	Research Master's
Gcina Mafukazi Maziya	M	Swaziland	Pursuing other opportunities	
Hagos Hailu Gidey	M	Ethiopia	Pretoria	PhD
Ibrahim Ahmed Abdellah Ahmed	M	Egypt	Pursuing other opportunities	
Jacquiline Wangui Mugo	F	Kenya	Cape Town	Research Master's
Jeffrey Ted Johnattan Mbongo Nkounga	M	R Congo	AIMS-SA/Stellenbosch	Research Master's
Jummy Funke David	F	Nigeria	British Columbia	
Khaphetsi Joseph Mahasa	M	Lesotho	KwaZulu-Natal	Research Master's
Koffi Messan Agbavon	M	Togo	KwaZulu-Natal	Research Master's
Maha Mohamed	F	Sudan	Pursuing other opportunities	
Marie Yvonne Uwera	F	Rwanda	Stellenbosch	Research Master's
Mark Musonda Webster Shawa	M	Zambia	Rhodes	Research Master's
Mirette Magdy Abdelmageed Fawzy	F	Egypt	Cape Town	Research Master's
Mpumelelo Matse	M	Swaziland	Simon Fraser	Research Master's
Mustafa Abaas Mohamedelkhair Ahmed	M	Sudan	Johannesburg	Research Master's
Myriam Mahaman	F	Madagascar	Berlin Mathematical School	Research Master's
Nadine Tchamba Yimga	F	Cameroon	Freiburg, Germany	PhD
Nephtale Bvalamanja Mumba	M	Malawi	Western Cape	PhD
Olajumoke Yetunde Fashomi	F	Nigeria	KwaZulu-Natal	Research Master's
Oluwafisayo Yewande Omikunle	F	Nigeria	Pursuing other opportunities	
Oteng Maphane	M	Botswana	Namibia	PhD
Princess Chidinma Anusionwu	F	Nigeria	Pursuing other opportunities	
Rasha Abbas Ahmed Elameen Ehaimer	F	Sudan	Pursuing other opportunities	
Richard Junganiko Munthali	M	Malawi	Cape Town	Research Master's
Simachew Endale Ashebir	M	Ethiopia	Pursuing other opportunities	
Sobhy Elsayed Mohammed Elmahdy Lotfy Kholiaif	M	Egypt	Jena University	Research Master's
Tanjona Fiononana Ralaivoasaona	F	Madagascar	AIMS-SA/Stellenbosch	Research Master's
Tina Ambinintsoa Malalanirainy Rokotoson	F	Madagascar	Cambridge	Research Master's
Titus Okello Orwa	M	Kenya	Stellenbosch	Research Master's
Valisoa Razanajatovo Misanantenaina	F	Madagascar	Stellenbosch	Research Master's
Vernon Maluba J Chisapi	M	Zambia	Stellenbosch	Research Master's
Woinshet Defar Mergia	F	Ethiopia	Western Cape	PhD
Yae Olatoundji Kowowale U Gaba	M	Benin	Cape Town	PhD

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 *		470	321	149
PhD **	Completed	55	45	10
	In progress	148	113	35
Research Master's **	Completed	233	165	68
	In progress	86	55	31
Post Doc Researcher **		36	25	11
Teacher/Lecturer **		108	72	36
Industry **		57	44	13

*as at June 2013

**as at December 2012

Oluwasola Fasan, who graduated from AIMS in 2008, was selected as one of the ten L’Oreal-UNESCO women in science regional fellows for 2012/2013.

Two AIMS Alumni gave talks at a UCT Physics colloquium on Wednesday 29 August 2012. Dawit Worku, Cape Peninsula University of Technology, gave a talk titled, “The Status of the Hadron Resonance Gas Model and its Extension in Thermodynamic Quantities.” David Unuigbo, UCT Physics

gave a talk titled, “Characterisation of silicon nanoparticles produced by mechanical attrition.”

On Friday 9 November 2012, AIMS-SA hosted a series of talks by some of its proud alumni who have gone on to work or study in interesting fields. The event formed part of the “10 years of AIMS” celebrations and allowed AIMS alumni to provide both an introduction to their work/fields for nonexperts and a description of their technical project/role, as well as a chance for discussions in person. Another aim of this event was to encourage contact between AIMS researchers and staff, and previous students and all alumni in the Western Cape were encouraged to attend and to meet prospective colleagues. The alumni who gave presentations were Mihaja Ramanantoanina, Damian Kajunguri, Collins Amburo Agyingi, Siaka Lougue, Hassana Al-Hassan and Chika Ogochukwu Yinka Banjo.

Prosper Ngabonziza, who graduated from AIMS in 2010, was awarded the S2A3 medal for the most meritorious Master’s dissertation in a Science department in South Africa, at a ceremony at the University of Johannesburg on 29 May 2013. “I take this opportunity to thank again the AIMS community for its support in my MSc programme. This may be encouraging on your side for all the efforts you put in helping other African students towards their postgraduate education.”

Global Alumni Reunion



AIMS-NEI organised the first ever Global Alumni Reunion, entitled “Transforming Africa Through Knowledge-Based Enterprise”. This reunion marked the 10-year anniversary

of AIMS and was held from 27 to 29 June at the Muizenberg Pavilion in Cape Town, South Africa.

This meeting brought together over 240 participants from 44 countries comprising leaders from educational systems, research institutes, governments, the scientific community, civil-society organisations and AIMS alumni, to address how education in mathematical sciences can transform the African continent.

On the opening day, Thierry Zomahoun, AIMS-NEI Executive Director, supported by the AIMS team made an official “Call for Action” which demands that officials push for tertiary education, mathematical science education and innovation across the continent. He also announced the creation of The Next Einstein Forum – a global high-level forum on science and innovation for development with an anticipated launch in Addis Ababa in 2015.

Other highlights of the conference included discussions around the role of research in African development, creating a knowledge-based economy, gender in relation to science, entrepreneurship and an address by South Africa’s Minister of Home Affairs, Naledi Pandor.

The event also saw the formation of the AIMS Alumni Association and its Steering Committee.

The event was supported by the IDRC, Robert Bosch Stiftung, Perimeter Institute and the International Centre for Theoretical Physics.



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

For the past five years AIMS 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.

Five students graduated at the end of 2012 bringing the total number of graduates to 22. The seven students enrolled in this year's programme are Lezanie Coetzee, Antoine de Kock, Roger Lourens, Mulalo Makhuvha.



Period	Lecturer	Topic
28 January – 15 February	Wilson Lamb, Strathclyde	Analytical Techniques in Mathematical Biology
25 February – 15 March	Bill Noble, Washington	Bioinformatics
18 March – 5 April	Dan Jacobson, Stellenbosch	Biomathematics
18 March – 5 April	Florian Rupp, Munchen	Applied Ito Stochastic Differential Equations in Population Biology and Sociology
15 April – 3 May	Lafras Uys, AIMS-SA	Systems Biology
6 May – 24 May	Paul Taylor, New Jersey	Medical Signal Processing
27 May – 14 June	Juliet Pulliam, Florida	Introduction to Biomedical Sciences

Courses towards a BSc Honours in Mathematical Finance

This honours degree programme run jointly by SU and AIMS is designed to provide students with the skills necessary for solving realistic problems in finance.

At the end of 2012, four students graduated from the first group, one with honours. The eight students currently enrolled on this programme are Mesias Alfeus, Manoke Jason Maake, Maanda Terrence Maduwa, Innocent Nqoba Mbona, Richard Mhango, Viwe Mgoqi, Celumusa Duncan Mkhize and Fulufhelo Mphephu.

The Financial Mathematics courses taught at AIMS included the following:

- Measure Theory- (Jurie Conradie)
- South African Financial Markets- (Sure Mataramvura)



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 to study at South African universities. This year AIMS awarded 18 such

bursaries for Master's study and three bursaries for study towards PhDs (see the table under Progress of Students for the names of the bursary recipients).



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.

New awards for 2013 were made to:

Students	Gender	Country	University
Ammar Abdalgabar	M	Sudan	Witwatersrand
Alex Samuel Bamunoba	M	Uganda	Stellenbosch
Omowunmi Elizabeth Falola	F	Nigeria	Cape Town
Holifidy Arisoa Rapanoel	F	Madagascar	Cape Town
Savannah Nuwagaba	F	Uganda	Stellenbosch
Masimba Energy Sonono	M	Zimbabwe	North-West
Fortunat Rajaona	M	Madagascar	Stellenbosch

In addition to the new awards, scholarships of 13 DAAD scholars in their second and third year of study were renewed.

A number of DAAD scholarships holders in previous years graduated. Mohamed Suleiman Hussein Suleiman, Alnadhief Hamed Ahmed Alfadeel, Olutayo Kehinde Boyinbode,

Tchilabalo Abozou Kpanzou, Badr Awad Elseid Mohammed and Ando Desire Razafindrakoto graduated in December 2012. Roland Loufouma Makala graduated in April 2013.

Dr Ando Desire Razafindrakoto (Madagascar) has been accepted at AIMS for six months on a DAAD Postdoctoral Fellowship in sub-Saharan Africa starting 1 July 2013.

The AIMS Research Centre was strengthened during the period by the following new appointments:

- The Research Chair in Cosmology with Multi-Wavelength Data, Professor Romeel Davé, took up his position in January 2013. This position is jointly held between UWC (60%), SAAO (30%) and AIMS (10%).
- Professor Johan de Villiers was appointed as resident researcher in Analysis and Approximation Theory.
- Dr Lafras Uys, was appointed as resident researcher in the area of Biomathematics.
- Professor Martin Kunz joined the Research Centre as an SKA Africa Visiting Professor from January 2013.
- The Research Chair in Mathematical and Physical Biosciences (jointly held with Stellenbosch University) is in the process of being appointed.

The following Associate Research Fellows were appointed in August 2012:

Name	Affiliation
Professor Jacek Banasiak	KwaZulu-Natal
Professor Florian Breuer	Stellenbosch
Professor Robert de Mello Koch	Witwatersrand
Professor Roy Maartens	SAAO, Western Cape
Professor Phillip Mashele	North-West
Professor Jamshid Moori	North-West
Professor Nicola Mulder	Cape Town
Dr Nazeem Oozeer	SKA
Professor Mamadou Sango	Pretoria
Dr Simukai Utete	CSIR

The visitors programme continued with support from the Department of Science and Technology and the National Research Foundation. Twenty-nine researchers visited during the period under review.

Profiles

Professor Romeel Davé, South African Research Chair in Cosmology with Multi-wavelength Data

Professor Romeel Davé holds the South African Research Chair in Cosmology with Multi-wavelength Data, jointly held between the African Institute for Mathematical Sciences, the University of the Western Cape, and the South African Astronomical Observatory. His work centres on answering the question, why does the Universe look the way it does? Modern surveys map out the Universe using primarily galaxies, and hence his main focus is to understand how galaxies form and evolve out of the primordial fluctuations imprinted shortly after the Big Bang. He uses cosmological hydrodynamic simulations run on high performance supercomputers to develop and refine models of galaxy evolution, and compares them to observations to constrain the physical processes that shape galaxies from the epoch of reionisation until today.

Professor Davé works closely with the Cosmology group at AIMS, led by Professor Bruce Bassett, to determine how our

understanding of galaxies can help teach us about some of the greatest mysteries in science today, in particular the nature of dark matter and dark energy that make up 95% of our Universe.



"AIMS provides a stimulating and congenial environment to think 'outside the box' about how we can push galaxy evolution and cosmology in new directions using South Africa's present and upcoming telescopes. In my six months at AIMS, we have already started several interesting projects and collaborations relevant to MeerKAT and (eventually) the SKA. AIMS is a great place to think, relax, and do great science!"

Professor Martin Kunz, joint visiting professorship

Professor Martin Kunz is currently a SKA Africa Visiting Professor at the AIMS Research Centre, where he is working three to four months a year from 2013 until 2015, and he has visited AIMS (and UCT, SAAO as well as UKZN) several times before. When he is not in Cape Town, he studies the evolution and large-scale structure of the Universe at the Theoretical Physics department of the University of Geneva in Switzerland. He enjoys building theoretical models and investigating their impact on astronomical observations, as well as using Bayesian statistics for data analysis. Even though he has a theoretical physics background, he is involved in several observational projects: he is core team member of the Planck satellite and theory co-ordinator for the Euclid satellite project. He is also a council member of the International Astrostatistics Association.

"I always enjoy my visits to AIMS; there is a vibrant atmosphere of open possibilities, collaboration and progress. South Africa has become a fantastic research hub, especially for cosmology, with first-class facilities and programmes like SKA and SALT, and several top institutions. Not to forget of course the outstanding natural beauty of the Cape. If you add to this the role of AIMS as an academic gateway between Africa and rest of the world, then it is no wonder that I keep coming back."



Dr Sehun Chun, resident researcher

Dr Sehun Chun is a resident researcher at AIMS in the multidisciplinary field of mathematical and physical biology. After completing his undergraduate degree at Seoul National University, South Korea, he moved to the United States to complete his MSc in mathematics at Purdue University and PhD in Applied Mathematics at Brown University. After a short stay at Carnegie Mellon University, he moved to Imperial College London, United Kingdom, for his postdoctoral career and then joined the AIMS Research Centre in January 2012.

His research interest focuses on two main interdisciplinary areas: One is the study of cardiac electrophysiology in the

perspectives of physics such as geometrical or quantum physics. The other is the development of numerical schemes for partial differential equations by incorporating a geometrical concept, called 'the method of moving frames'. While he supervised two AIMS Master's students in 2012 and in 2013, he also made an effort to introduce diverse interdisciplinary sciences to African students.



Dr Magdaleen Marais, postdoctoral fellow

Dr Magdaleen Marais completed her PhD in Mathematics on research in Ring Theory, under the supervision of Professor Leon van Wyk at Stellenbosch University. During her PhD studies she was appointed as a part-time lecturer for first-year Mathematics students. In 2011 she started as a postdoctoral fellow at AIMS, focusing on Computational Algebra with Professor Barry Green as her host. Here she came into contact with Professors Gerhard Pfister, Wolfram Decker and Gert-Martin Greuel from the Singular team stationed at the Technische Universität Kaiserslautern in Germany. Professor Pfister and Decker are distinguished research fellows at AIMS.

From January 2012 to August 2013, she has been moving every couple of months between AIMS and the Technische

Universität Kaiserslautern on invitation of Professors Greuel and Decker. During this time, she has done research on the classification of real singularities using the Singular computer algebra system.

"AIMS kick-started my career as a researcher. Being at AIMS I came into contact with high calibre researchers that want to make a difference in the research output of Africa and therefore want to make a difference in my development as researcher, which they did!"



The following Master's and doctoral students graduated under the supervision of researchers at AIMS:

Name	Citizenship	Gender	Degree	Research field	Supervisor	Graduated
Okouma, Patrice Martin	Gabon	M	PhD	Cosmology	Professor B Bassett	December 2012
Clarke, Alan	South African	M	Master's	Cosmology and Astrophysics	Professor B Bassett	December 2012
Kasai, Eli	Namibia	M	Master's	Cosmology and Astrophysics	Professor B Bassett & Professor S Crawford	March 2013
Kateregga, Michael	Uganda	M	Master's	Financial Mathematics	Professor R Ghomrasni	December 2012
Njau, Mercy	Kenya	F	Master's	Financial Mathematics	Professor RI Becker	June 2012
Rajaona, Fortunat	Madagascar	M	Master's	Theoretical computer science	Professor J Sanders	March 2013

Postdoctoral fellows at AIMS during the period under review

Name	Citizenship	Gender	Research field	Supervisor	Period
Gavhi, Rejoyce	South African	F	Optimal C3 Interpolatory Subdivision Scheme with Fractal Curves	Professor J de Villiers	1 July 2013 – 30 June 2015
Marais, Magdaleen	South African	F	Computational Algebra and its applications	Professor BW Green	1 Jan 2011 – 31 Dec 2014
Khosravi, Nima	Iran	M	Theoretical and Observational aspects of Modern Cosmology	Professor B Bassett	15 Dec 2011 – 30 Sep 2013
Okouma, Patrice Martin	Gabon	M	Cosmology with SALT and Meerkat	Professor B Bassett	1 Dec 2012 – 30 Nov 2014
Ralaivaosaona, Dimbinaina	Madagascar	M	Limit theorems for random combinatorial structures	Professor BW Green	1 July 2012 – 31 June 2013
Sivanandam, Navin	United Kingdom	M	Early Universe Cosmology and Inflation	Professor B Bassett	24 Oct 2011 – 23 Oct 2013
Uys, Lafras	South African	M	Coupling of Biochemical Reaction Networks with Advection-Diffusion models	Professor BW Green	1 Jan 2010 – 31 Dec 2012



Visiting researchers

Visitors this year included Professor Dr Mama Foupouagnigni from the Department of Mathematics, University of Yaounde, Cameroon who visited in April to interact with students and academic staff and discuss possible cooperation between AIMS-SA and the Cameroonian mathematics community.

During the period under review, the Research Centre had a least 350 visitors including workshop and conference participants. Those listed below spent time in the Research Centre working on projects:

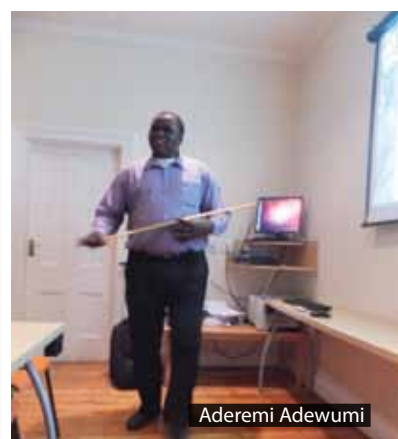
Visiting researcher	Status	Affiliation	Area of research	Period of visit
Adewumi, Aderemi	Visiting researcher	University of Kwazulu-Natal, South Africa	Computer Science	9 – 14 May 2013
Aich, Moumita	Visiting postdoctoral fellow	University of Kwazulu-Natal, South Africa	Cosmology	6 – 19 May 2013
Amery, Gareth	Visiting researcher	University of Kwazulu-Natal, South Africa	Applications of category theory to cosmology and biology	29 April – 17 May 2013
Bartlett, Bruce	Visiting researcher	Stellenbosch University, South Africa	Applied mathematics	5 – 12 October 2012
Burmeister, Rodger	Visiting PhD student	Technical University of Berlin	Formal methods for multi-agent systems	6 – 30 March 2013
Decker, Wolfram	Distinguished research fellow	Kaiserslautern University, Germany	Algebraic Geometry	16 – 22 March 2013
Fall, Mouhamed Moustapha	Visiting researcher	Research Chair, AIMS-Sénégal	Partial Differential Equations and Differential Geometry	23 – 30 June 2013
Fowkes, Neville	Visiting researcher	University of Western Australia	Continuum mechanics problems arising out of industrial and scientific contexts	20 – 24 January 2013
Jarden, Moshe	Visiting researcher	University of Tel Aviv, Israel	Field Arithmetic	29 March – 24 April 2013
Kassa, Semu Mitiku	Visiting researcher	Addis Ababa, Ethiopia	Biomathematics	13 August – 13 October 2012
Kunz, Martin	Visiting professor	University of Geneva, Switzerland	Non-Gaussianity, the CMB, and the early universe	1 February – 6 March 2013
Lochowski, Rafal	Visiting researcher	Warsaw School of Economics, Poland	Stochastic processes and their application in financial mathematics	2 October – 15 December 2012 and 5 February – 30 June 2013
Mafuta, Armeline	Visiting PhD student	University of Kwazulu-Natal, South Africa	Computer Science	3 – 14 May 2013
Mama, Foupouagnigni	Visiting researcher	University of Yaounde, Cameroon	Orthogonal Polynomials	22 – 24 April 2013
Minda, David	Visiting researcher	McMicken College of Arts and Science, Cincinnati, USA	Role of conformal metrics, especially the hyperbolic metric, within complex analysis.	9 January – 7 April 2013
Motsumi, Teko	Visiting researcher	University of Gaborone, Botswana	Applied Mathematics	13 January – 12 July 2012
Nannyonga, Betty	Visiting researcher	Makerere University, Uganda	Mathematical Bio-economics, Mathematical Biology	15 December 2012 – 15 March 2013
Osei, Prince Koree	Visiting PhD student	University of Ghana	Gauge theories, quantum gravity, quantum groups	19 November – 12 December 2012
Ouhinou, Aziz	Visiting researcher	University of Sultane Moulay Slimane, Marrakesh	Biomathematics	11 June – 10 August 2013
Pfister, Gehard	Distinguished research fellow	Kaiserslautern University, Germany	Algebraic Geometry	16 March 2013 – 22 March 2013
Polthier, Konrad	Visiting researcher	Berlin Mathematical School, Germany	Discrete Geometry and Visualisation	5 – 12 October 2012
Razafimanantsoa, Gerard	Visiting researcher	University of Antananarivo, Madagascar	Mathematics: Drinfeld Modules	2 – 9 February 2013
Rabarison, Patrick	Visiting researcher	University of CAEN, France	Group number theory	2 – 9 February 2013
Sango, Mamadou	Visiting researcher	University of Pretoria, South Africa	Applied mathematics	1 – 15 June 2013
Tall, Amadou	Visiting researcher	Academic Director, AIMS-Sénégal	Cryptography	1 – 31 July 2013
Taylor, Paul	Visiting researcher	University of Medicine and Dentistry, New Jersey	Neuroimaging and biomedical signal processing	17 September 2012 – 15 July 2013
Wafy, Maged	Visiting researcher	Helwa University, Egypt	Statistical techniques, Bayesian techniques	21 January – 19 April 2013
Wamba, Etienne	Visiting researcher	Yaounde University, Cameroon	Condensed Matter Physics	29 June – 31 August 2013
Zabsonre, Issa	Visiting researcher	Ougadougou University, Burkina Faso	Non-linear analysis	13 August 2012 – 13 February 2013
Zintle, Joerg	Visiting researcher	Kaiserslautern University, Germany	Algebraic Geometry	9 January – 25 April 2013



Betty Nannyonga



Moumita Aich



Aderemi Adewumi

Honours and achievements

Some of the more notable achievements during this period were:

- PhD student in the AIMS Research Centre, Michelle Knights, won the national finals of the FameLab competition held at the SciFest in Grahamstown. Michelle attended a science communication master-

class and proceeded to compete in the finals of the international competition in June 2013 in London.

- Professor Bruce Bassett was appointed Vice-President at large for the International Astrostatistics Association. He was also awarded a scholarship through the Bill and Melinda Gates Foundation to attend the TED Global 2013 event in Edinburgh in June.

Seminars

Weekly journal club talks were held throughout the year, providing an opportunity for staff, students and visitors to share their work. Highlights of the series included Dr Lafras Uys's (AIMS) inspiring account of "The Meaning of Liff or: Constraints on Biological Models Using Category Theory and Haskell" which addressed the most central and fundamental problems of biology today and explained Haskell's programming language for working with biological data; and Professor David Minda's (Department of Mathematical Sciences, University of Cincinnati, USA)

excellent, general talk on Hyperbolic Geometry and Conformal Images.

The Cosmology Group seminars during this period included talks by Rene Breton (Southampton), Moumita Aich (UKZN), Gareth Amery (UKZN), Danielle Wills (Durham) and Tomi Koivisto (Institute for Theoretical Astrophysics, Oslo), Mustafa Amin (Cambridge), Joel Johansson (Stockholm), Yann Mambrini (Paris) and Paul Taylor (AIMS).

Publications

2013 (36)

29 papers published in *Planck collaborations* by **M Kunz** et al.

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).

BW Green. Bounds on the automorphisms of curves over algebraically closed fields. *Israel Journal of Mathematics*, 194 (2013), pp 69-76.

M Knights, B Bassett, M Varughese, R Hlozek, M Kunz, M Smith, **J Newling**. Extending BEAMS to incorporate correlated systematic uncertainties. *Journal of Cosmology and Astroparticle Physics*, 01 (2013), 039.

M Kunz, R Hlozek, **B Bassett**, M Smith, J Newling, M Varughese. BEAMS: Separating the Wheat from the Chaff in Supernova Analysis. *Astrostatistical Challenges for the New Astronomy Springer Series in Astrostatistics*, 01 (2013), pp 63-86.

RM Łochowska, P Miłośb. On truncated variation, upward truncated variation and downward truncated variation for diffusions. *Stochastic Processes and their Applications*, 123 (2) 2013, pp 446-474.

PM Okouma, Y. Fantaye, **BA Bassett**. How Flat is our Universe Really? *Physics Letters B*, 719 (1), 2013, pp 1-4.

Xi Liu, Shaofa Yang and **JW Sanders**. Compensation by design. *Formal Aspects of Computing*, 2013.

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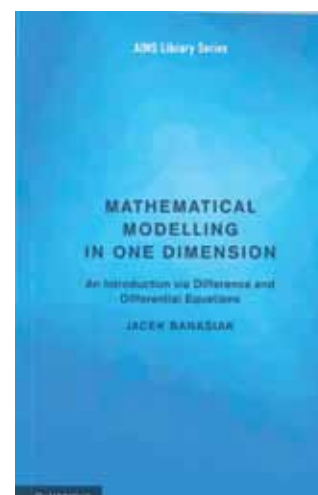
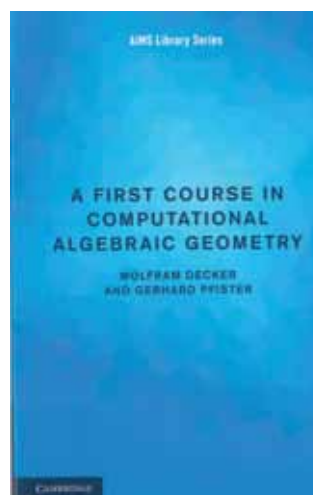
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AIMS Library Series

The fifth book in the series titled, *A first Course in Computational Algebraic Geometry* by Wolfram Decker and Gerhard Pfister was published in December 2012. *Mathematical Modelling in One Dimension*, by Jacek Banasiak, is the sixth book in the series and was published in February 2013.

Alan Beardon continues as the editor of the AIMS Library Series. The texts are published by Cambridge University Press, and are intended to cover as diverse a range of mathematics and its applications as possible, roughly at a level of the AIMS lecture courses.



AIMS Schools Enrichment Centre (AIMSSEC)

AIMSSEC also celebrated 10 years of existence in June this year. Motivated by the inequalities in South Africa, Toni Beardon set up AIMSSEC in 2003 with a mission to bring new skills, new hopes and new horizons for mathematics to South Africa. To date over 1000 teachers have been part of its programmes.

It was with great delight that six graduates of the AIMSSEC Advanced Certificate in Education (ACE) course – Miss Thelma van Vught, Miss Nompumelelo Maqholo, Mrs Cecilia Perring, Mr Mhlangabezi Gcali, Mr Clinton Mthi and Ms Sagree Pillay – accepted invitations to attend the AIMS graduation ceremony where they were awarded certificates as outstanding AIMSSEC graduates. Ms Sagree Pillay also made a very moving speech about her experiences with AIMSSEC and ended with “Thank you AIMS and AIMSSEC for lighting the flame in us”.

AIMSSEC recently received a three-year grant from the Department of Higher Education and Training (DHET) through the National Skills Fund (NSF). This funding will enable AIMSSEC to continue and to expand its teacher development programmes. There are plans to advertise more positions in the near future and we look forward to developing a long and rewarding relationship with the DHET.

During May 2013, AIMSSEC was invited to form part of a European Commission FP7 Science in Society consortium to do research with eight European Universities. The title of the research programme is “Improving Progress for Lower Achievers through Formative Assessment in Science, Technology and Mathematics Education” (FaSTMeD). In short: “The project will use evidence-based approaches to working with low-attaining pupils and transforming teaching to raise achievement in mathematics and science in primary and secondary education through the development of technologically enhanced practices of formative interpretations of assessment within day-to-day teaching approaches.” As the only non-European partner we are very proud to form part of this team and we plan to appoint a principle researcher and a research assistant with the grant funding for the three-year period starting in January 2014.

South Africa is ranked 143rd out of 144 countries for the lowest quality of its school mathematics and science education (*Global Competitiveness Report, World Economic*

Forum 2012/2013). To address this problem AIMSSEC is building capacity to meet the pressing demand from teachers for professional development. Teachers need lifelong learning to keep up to date with content knowledge, teaching techniques and the changing demands of the world of work. AIMSSEC offers Mathematics Subject Leader Training courses to empower teachers so that they can, in turn, train other teachers.

The combination of the Mathematical Thinking (MT) and ACE courses provides an in-service training programme for mathematics teachers from intermediate, senior and FET phases. These courses are designed for the majority of mathematics teachers who are mathematically under-qualified, to prepare them to be effective Heads of Department and Subject Advisers. The aim of the project 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 TV sessions, discussions via the Moodle course management system and formal examinations.

Over the last ten years, the AIMSSEC three-month Mathematical Thinking course has been run 20 times for 1088 teachers and subject advisors from all parts of South Africa. The course promotes a learner-centred, activity-based approach to teaching, while consolidating educators’ subject knowledge, with a particular focus on content that is newer to the curriculum. It emphasises understanding and encourages a shift away from “chalk and talk” and rote learning. Daily IT sessions develop computer skills and familiarise the teachers with free software and online resources. The teachers submit two assignments in the following three months reporting on how they have implemented lesson plans that put the AIMSSEC teaching philosophy into practice.

The ACE course which trains Mathematics Subject Leaders, is a two-year blended learning programme with four residential units, taught in partnership with the University of Fort Hare. It is currently an ACE course at NQA Level 6 but it will be adapted to align with new Advanced Certificate in Teaching (ACT) accreditation criteria.



In December 2012, a group of 25 ACE students graduated through the Institute for Mathematics, Science and Technology of the University of Stellenbosch (IMSTUS). Our partnership with IMSTUS produced 70 graduates in total from 2010 to 2012. On 10 May 2013 our first group of 31 ACE students graduated through the University of Fort Hare. The AIMSSEC/University of Fort Hare ACE programme is the subject of a three-year research and evaluation study by Kellelo Consulting and Professor Jill Adler funded by the Zenex Foundation.

Kellelo released the final version of the second part of the evaluation of the programme on 26 April 2013 and we are proud of the many positive aspects highlighted in the report. The following quote was taken from page 6 of the Executive Summary:

"At the end of the programme (November 2012) the teacher ratings of the ACE programme as a whole, as well as the overall quality of the programme materials was overwhelmingly positive with more than 80% of teachers responding describing these as excellent or good."

From page 7 of the Executive Summary:

"The vast majority of teachers rated the relevance of the programme highly, with more than 95% of teachers considering its relevance to be 'excellent' or 'good'. This was with regard to all aspects of relevance reported on: knowledge of mathematics, improving classroom teaching, instructional and subject leadership skills and sensitivity to classroom realities."

Through the AIMING HIGH online community, available at www.aiminghigh.aimssec.org, AIMSSEC supports current students and alumni and provides an online forum to discuss a problem-solving approach to teaching mathematics. Cellphone access to the internet enables them to share ideas and to support each other. AIMSSEC has also built capacity for the teacher network by setting up a new Interactive Telematic Education (ITE) Learning Centre in Cradock in January 2013. This is in addition to the learning centres in Mthatha and Queenstown, which were set up in 2012, and the existing centres in Port Elizabeth and East London.

AIMSSEC started a new course – the AIMING HIGHER 'Maths with Wings' in January 2013. The course objectives are to enable teachers to teach up to an internationally equivalent university entrance standard (for example the South African Advance Mathematics Programme), to inspire teachers to

learn more university-level mathematics relevant for school teaching, to develop their teaching skills and to help them foster learners' skills of mathematical reasoning, problem-solving, independent learning, collaborative learning and communication. Selection criteria require mathematical and teaching qualifications with at least three years' experience, proven competence in teaching at FET obtaining good results with their grade 12 learners. Two two-week residential units were held during school holidays in January and July with blended learning and assignments between the residential units.

From 13 to 15 January AIMSSEC hosted a workshop for the lecturers – The Institute for Mathematical Pedagogy (IMPZA2). Professor John Mason invited participants to engage in some tasks that highlight the central role of variation in teaching and learning mathematics.

We would like to say thank you to our volunteers in particular Toni Beardon who has worked very hard to establish and grow AIMSSEC to what it is today. Other volunteers like Cynthia Fries, Christine Hopkins and Alison Clark-Wilson have worked for us for up to four months at a time and AIMSSEC has a dedicated team of lecturers who come from overseas to teach our residential courses.

To raise funds for AIMSSEC, Bubblz the Maths Clown climbed the 5,895 metre Mt Kilimanjaro on 27 January 2013 making history as the first clown to climb Africa's highest peak. In June, she attempted to break a world record by building a 13-metre high Sierpinski balloon sculpture. Bubblz has done two teaching tours in South Africa and has taught on one of the AIMSSEC courses. She plans many other fundraising activities in order to meet her target of raising one million rand for AIMSSEC. Please support her by donating through <http://bit.ly/MtK2013> or <http://bit.ly/MtK2013ZAR>.

AIMSSEC will continue its global links, its community involvement with local schools and the tutoring and mentoring involving AIMS students and graduates. AIMSSEC plans to expand 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 and AIMS-Cameroon.



Workshops and Conferences



Discrete Geometry and Visualisation

The following conferences and workshops were held during the period under review:

The joint **AIMS-Berlin Mathematical School Workshop on "Discrete Geometry and Visualisation"** took place at AIMS from 8 to 12 October 2012 and formed part of the **German-South African Year of Science 2012/13** programme of activities. The 36 delegates included students from AIMS and South African universities. They were introduced to recent developments in discrete (differential) geometry with applications to computer graphics and mathematical visualisation. The workshop included software tutorials, mathematical visualisations and animated film sequences. The coordinator and one of the speakers at the workshop was Professor Konrad Polthier, head of the Mathematical Geometry Processing group at the Institute of Mathematics at Freie Universität Berlin.

AIMS and the University of Cape Town co-hosted a **Workshop on Geometric Analysis** from 3 to 7 December 2012. There were 23 participants. This workshop featured mini-courses by Richard M Schoen of Stanford University and Daniel Pollack of the University of Washington, and lectures by other invited speakers.

AIMS Associate Faculty member, Professor Robert de Mello Koch from the University of the Witwatersrand presented a gentle introduction to **Quantum Field Theory** from 3 to 21 December at AIMS. The course was attended by 25 participants including 18 students from the UCT and SU.

The tenth **South African Mathematics-in-Industry Study Group** co-hosted by AIMS and the University of the Witwatersrand took place in Johannesburg from 9 to 18 January 2013. Six AIMS students attended this meeting. One of the facilitators, Dr Neville Fowkes visited the AIMS Research Centre for a short period after the event.

This sixth **Summer School in Mathematical Finance** was held at AIMS from 21 to 23 February 2013. This workshop formed part of the MPE2013 initiative and presented a unique opportunity for 68 local practitioners, academics and students in mathematical finance to interact with leading international researchers on topics and modelling techniques current in the South African and international financial markets. Speakers included: Carol Alexander, Professor of Finance, University of Sussex Business School; Nick Webber, Principal Lecturer and Research Coordinator, De Montfort University, Leicester; and Stéphane Crépeym, Professor in the Mathematics Department, University of Evry.

The **Workshop on Environmental Impact Assessment and Decision Making 2013** was held from 16 to 22 March 2013. It was co-funded by the World Bank and the International Statistical Institute. The workshop featured a course presented by the international expert in environmental statistics, Professor A H El-Shaarawi. There were 14 participants.



Workshop on Geometric Analysis



Quantum Field Theory



Environmental Impact and Decision Making

Mathematical Modelling of Geophysical Fluids

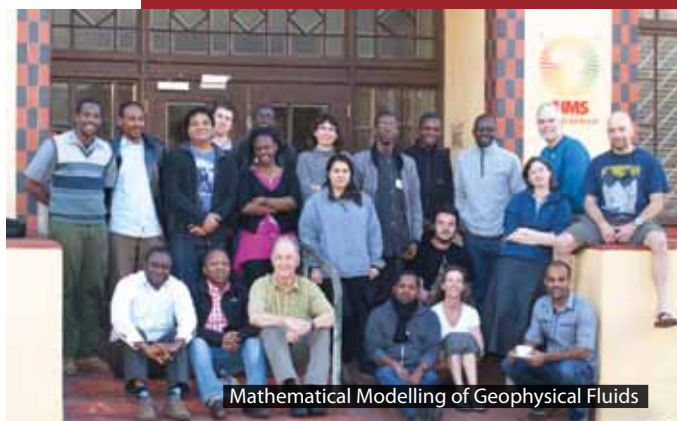
2013 This workshop, attended by 18 participants, took place at AIMS from 13 to 17 May 2013 as part of the MPE2013 Initiative. Douw Steyn, AIMS associate faculty member and professor in the Department of Earth, Ocean and Atmospheric Sciences, University of British Columbia (UBC) together with four UBC colleagues, Professors Susan Allen, Christian Schoof, Mark Jellinek and Catherine Johnson were joined by Dr Babatunde Abiodun (UCT) and Professor Mapundi Banda (SU). This workshop presented an introduction to the mathematical modelling of geofluids (atmosphere, ocean, ice, lava and deep mantle) from a unified and coordinated perspective. The presenters, all world leaders in their respective fields, gave a broad overview of essential topics through lectures, exercises, and computational/field studies.

The **SuperJEDI 2013 Workshop**, organised by the Cosmology group at AIMS, was held from 30 June to 8 July 2013 in Mauritius and attended by 40 participants. The themes of the workshop were Science with Planck, Astrostatistics, Theory in the Era of Big Data, Visualisation and Computation and Multi-wavelength Astronomy and Cosmology. The pre-Jedi event, led by South African students, was held from 26 to 28 June and was attended by 20 Mauritian students who undertook introductory projects in astronomy research.

The South African Centre for Epidemiological Modelling and Analysis (SACEMA), in collaboration with AIMS-SA, held the fourth annual **Clinic on the Meaningful Modelling of Epidemiological Data (MMED)** from 3 to 14 June 2013. The clinic emphasised the use of data in understanding infectious disease dynamics using real data to grapple with practical questions in a meaningful way. The clinic had 50 participants and brought together graduate students and researchers from North America and Africa.

The **2nd African Women Mathematicians Workshop** held at AIMS from 17 to 19 July 2013 was attended by 33 women scientists and resulted in the creation of an association of African women in mathematics. Lectures, network activities and talks by participants on their respective research topics fell under the MPE2013 theme.

The **CIMPA Research School 22: Evolutionary equations with applications in natural science** was held from 22 July to 2 August 2013 as a collaborative effort of AIMS and CIMPA. The workshop explored evolutionary equations, which form part of the sophisticated mathematical techniques required to analyse models of natural phenomena. There were 44 participants including the nine speakers.



Mathematical Modelling of Geophysical Fluids



SuperJEDI 2013



Meaningful Modelling of Epidemiological Data



2nd African Women Mathematicians

Outreach, meetings and joint initiatives

AIMS online courses

This year AIMS decided to film selected courses and to make them available to a larger audience as an online facility. Leading international and local experts offer the courses at AIMS, which are three weeks long (each module consisting of 30 hours) and collectively form the coursework for the structured Master's degree which also includes a research component.

The essential features of the classes at AIMS are that, in contrast to formal lecture courses, they are highly interactive, where the students engage with the lecturer throughout the class time, are encouraged to learn together in a journey of questioning and discovery, and where lecturers respond to the needs of the class rather than to a pre-determined syllabus. AIMS' teaching philosophy is to promote critical and creative thinking, to experience the excitement of learning from true understanding, and to avoid rote learning directed only towards assessment.

The first of these courses, which is available online (www.youtube.com/user/AIMSacza), is by Professor David Spiegelhalter, and is titled "Probability and Statistics".

It is hoped that African universities will choose to use these courses to supplement and enhance their own postgraduate programmes. We believe this would be best achieved through engagement with AIMS. One way for this to happen, would be for AIMS to suggest or nominate a specialist tutor to spend time at the university, guiding students who follow the online programme. Where possible expert lecturers who have taught at AIMS may visit the university to give a short introduction to the course. We would welcome this interaction and hope that our online courses will make a significant contribution to the growth of the mathematical sciences ecosystem in Africa.



Public Lecture Series

During the period under review, AIMS presented a series of public lectures. They were attended by members of the public and AIMS students. The following lectures took place in the period under review:

- **Dr Andrew Hamilton**, Department of Physics, University of Cape Town, gave a talk titled: "The Higgs Boson: What's all the fuss about?" on 28 August 2012.
- **Professor David Spiegelhalter, Winton Professor for the Public Understanding of Risk**, gave a talk on 25 September 2012 titled: "What are your chances? Measuring and communicating acute and chronic risk".
- The mathematical theme of the year 2013 was declared by the International Mathematical Union to be *The Mathematics of Planet Earth*. On behalf of the South African Mathematical Society and the AIMS Public Lecture Series, **John Baez University of California, Riverside**, gave a talk via live streaming titled: "Mathematics of Planet Earth" on 30 October 2012 at SU.
- **Pierre Lena, Emeritus Professor, Université Paris Diderot & Délégation à l'éducation, Académie des sciences**, France gave a talk titled: "Renewal in basic science education in France and worldwide," on 22 November 2012.
- The first **TedxAIMS** event, organised by the Cosmology Group at AIMS was held on 20 January 2013 at the Muizenberg Pavilion. The theme for the event was *The future of who knows what* and speakers from AIMS included Professors Barry Green and Neil Turok.
- **Professor Nick Webber, Principal Lecturer and Research Coordinator** at De Montfort University, Leicester gave a talk on 26 February 2013, titled: "Markets and Morality: Is it possible to have ethical market valuations?"
- AIMS, as part of the Mathematics of Planet Earth 2013 Simons Public Lecture Series, presented a talk by **Professor Inez Fung, University of California, Berkeley** titled: "Climate Math". The sold-out event held in the Kramer Lecture Theatre at UCT, attracted members of the public, scholars, students and lecturers from other universities as well as AIMS students.
- **Professor Catherine Johnson Participating Scientist on the MESSENGER mission to Mercury** and a member of the Geophysics and Atmosphere & Magnetosphere Science Teams at the University of British Columbia gave a talk titled: "New Views of Mercury from MESSENGER" on 14 May 2013.



Professor Inez Fung, MPE2013 Public Lecture



CIMPA Research School



TEDxAIMS 2013



Professor Catherine Johnson, Public Lecture

Meetings attended

Professor Barry Green attended the Selection Committee meeting and interviews for the Endowed Chair in "Mathematics and its Applications" to be awarded by the Alexander von Humboldt Foundation in cooperation with the German Federal Ministry for Education and Research at AIMS-Sénégal, from 1 to 3 October 2012.

He also attended a meeting of the Ministerial Task Team on Mathematics and Science Foundation Programme, at the ministerial office in Pretoria on 17 October 2012.

Joint initiatives

Mathematics of Planet Earth 2013 is an initiative of mathematical sciences' organisations around the world designed to showcase the ways in which the mathematical sciences can be useful in tackling our world's problems. AIMS-SA was proud to be part of this special initiative by hosting several workshops and lectures related to the MPE2013 theme.

A number of the workshops and conferences held were part of a collaborative programme of activities or joint initiatives between AIMS and other Institutes: the MMED workshop is held annually in conjunction with SACEMA and a biennial CIMPA workshop is hosted by AIMS-SA. Workshops with the University of Kaiserslautern and the Berlin Mathematical School took place as part of the German-South Africa Year of Science with funding from the National Research Foundation.

In fulfilment of its partnership agreement with the University of British Columbia, AIMS hosted a workshop on the modelling of geophysical fluids facilitated by Professor Douw Steyn and his colleagues.

AIMS has a partnership agreement with the Council for Scientific and Industrial Research (CSIR) and the following activities took place in fulfilment of this agreement: a steering committee meeting was held in August 2012; AIMS researcher, Dr Sehun Chun, visited the Advanced Mathematical Modelling Group and the Gene Expression and Biophysics group of the CSIR in November 2012; Dr Musa Mhlanga from the CSIR visited AIMS in December 2012 to give a talk to students and researchers and Dr Natasha Govender from the CSIR co-lectured the "Intelligent Systems and Algorithms" review course for the January 2013 intake.

AIMS and the International Centre for Theoretical Physics (ICTP) signed a bilateral agreement allowing AIMS staff and students to visit ICTP and attend their conferences. A delegation from ICTP including the Director, Professor Fernando Quevedo, visited AIMS on 7 February 2013 for discussions on how to build closer ties between the two institutions.

The AIMS Network



AIMS-Ghana, the third centre in the AIMS Network opened on Saturday 25 August 2012 in Accra, with 27 students from 13 countries including Ghana, Benin, Congo, Egypt, Ethiopia, Kenya, Nigeria, Rwanda, Somalia and Togo. On 15 March 2013, nearly 200 guests, including representatives from the governments of Ghana and Canada, eminent professors, members of the diplomatic corps and local chiefs, attended a ceremony marking the official opening. They held their maiden graduation ceremony on 15 June 2013, 26 students graduated, eight of them female with five students receiving the top award, the Francis K A Allotey meritorious award.

AIMS-Sénégal held their second graduation ceremony on 15 June 2013, 34 students graduated, five of them female.



AIMS is officially launching its fourth centre in Cameroon. A Memorandum of Understanding and a Headquarters Agreement were signed with the Government of Cameroon on 12 July 2013. These agreements solidify the legal status of the AIMS Centre according to the laws of Cameroon, and the commitment by its government to contribute some USD\$5.3 million over the next five years. AIMS-Cameroon is expected to open in October 2013.

Various workshops and network training sessions were held throughout the year. Linda Camara, Communications Officer attended an Advancement Readiness Workshop in Sénégal from 12 to 13 September 2012. On 1 February 2013 in preparation for a weeklong Programme Implementation Planning (PIP) workshop, which was held from 4 to 8 February 2013, the AIMS-NEI Secretariat organised a one-day Results Based Management (RBM) training session to introduce key concepts and tools to the workshop participants. There were fifteen participants representing AIMS-SA, AIMS-Ghana, AIMS-Sénégal and the AIMS-NEI Secretariat.



On 4 February AIMS-NEI launched an important new programme called the "AIMS Industry Initiative". The initiative is a work placement programme through which AIMS graduates join the private sector for internships. Announcing the initiative during a visit to AIMS-SA, Canadian High Commissioner to South Africa, Gaston Barban, said, "I am pleased to see the private sector, including Canadian companies invested in Africa, supporting the AIMS work placement programme. This is a win-win initiative for both the companies and the graduates." High Commissioner Barban was accompanied by representatives from CAE Mining, McCain Foods and Rio Tinto who anticipate partnering in the initiative by making internships available to AIMS graduates.



The AIMS-NEI Secretariat moved to new premises in Claremont and recruited additional staff in the areas of Research, Finance, Monitoring and Evaluation, Information Management and Administration.

Visitors

September 2012

On 20 September, over 60 mathematical finance students from the University of Limpopo visited AIMS. The students learnt more about AIMS and the programmes on offer.

October 2012

A German delegation, led by Ms Maja Clausen, Head of Research, Science and Innovation at the German Embassy in Pretoria visited AIMS on 10 October 2012. Delegates were members of a Trade-Mission to South Africa and included the following Members of Parliament: Ulla Burchardt, the Committee Chairperson, Tankred Schipanski, Sylvia Canel and Michael Gerdes. Other delegates were Andreas Meyer, Mr Helge Mayer, the translator and a representative of the German Consulate in Cape Town. The visitors joined students and staff for afternoon tea. Professor Green welcomed the guests and this was followed by a short speech by Ms Burchardt. Members of the delegation then had a discussion with Professor Green and Professor Konrad Polthier (Head of the Mathematical Geometry Processing group at the Institute of Mathematics at Freie University Berlin) who was running a workshop at AIMS at the time.

Representatives of the Department of Science and Technology together with an Angolan delegation of representatives from their consulate, and the corporate sector and universities in Angola visited on 23 October 2012.

December 2012

On 7 December, four international academics visited AIMS: Professor Colin Grant, Pro-Vice-Chancellor (Internationalisation), Professor Dr Paul Milewski (Department of Mathematics) and Professor Stephen Gough (Associate Dean, Faculty of Humanities and Social Sciences and Director of the Centre for Research in Education and the Environment) from the University of Bath, and Professor Bernadette Franco, Faculty of Pharmaceutical Sciences, Department of Food and Experimental Nutrition, Universidade de Sao Paulo in Brazil. Professor Milewski had lectured previously on our Postgraduate Diploma programme. They were joined by Dr Christoff Pauw, Manager: International Academic Networks at Stellenbosch University.

On 15 December Professor Loyiso Nongxa, Vice Chancellor from the University of Witwatersrand visited AIMS for a meeting with Professor Green.

Lara Steyn, the TED Prize Director visited AIMS-SA on 28 December 2012. She took the opportunity to meet with Professor Green, Professor Bassett and Navin Sivanandam who together organised the TEDxAIMS event. She also met with students and gave them a brief overview of TED, how it was started and its connection with AIMS. Neil Turok was a TED prizewinner for the AIMS Next Einstein Initiative. She also told students about the TED fellows programme.



University of Limpopo students



German delegation



Angolan delegation



International academics



Canadian High Commissioner Gaston Barban

February 2013

On 4 February 2013, the Canadian High Commissioner to South Africa, Gaston Barban, visited AIMS-SA to make the announcement of the "AIMS Industry Initiative".

A delegation from the International Centre for Theoretical Physics including the Director, Professor Fernando Quevedo, visited AIMS on 7 February 2013 for discussions on how to build closer ties between the two institutions. Other members of the delegation included: Dr Ravi Sheth; Dr Clement Onime; Professor Sandro Scandolo, and Professor Fernando Villegas.

On 14 February 2013, Richard Pink, a leading mathematician in the field of arithmetical algebraic geometry from the Swiss Federal Institute of Technology (ETH) in Zurich, visited AIMS and gave a talk of general mathematical interest to AIMS students.



ICTP delegation

March 2013

A special tea was hosted by AIMS-SA for Professor Inez Fung on 26 March 2013 giving her the opportunity to meet with students and staff.

April 2013

A group consisting of 25 (mostly graduate) Mathematics and Physics students and two staff members from the University of Groningen visited AIMS-SA on 18 April 2013. The goal of the study trip was to give students an idea of science and education in different countries and cultures.

German Foreign Minister, Dr Guido Westerwelle, accompanied by a delegation of about 40 people including business representatives, government officials and the media, visited AIMS-SA on Sunday 28 April 2013. They were given a short tour of the facilities as well as presentations by AIMS-SA and AIMS-NEI with two students talking about their time at AIMS.



German Foreign Minister, Dr Guido Westerwelle

On 15 April 2013, Ms Pelagie Lefebwe, a programme officer at the IDRC, visited AIMS-SA.

May 2013

On 20 May 2013, AIMS had an important visit from Peter Braid, a Canadian MP, who has been very supportive of AIMS' Canadian funding, and Jean Lebel, the new president of the IDRC. The visitors met with Professor Green, and were then shown around and introduced to some of the students.



Canadian delegation

June 2013

On 18 June 2013 Mrs Kirsten Buchhon, Head of Cultural Affairs and Protocol Consulate General of the Federal Republic of Germany visited AIMS-SA.

Governance and Administration

Trust

The AIMS Trust met on 24 January 2013. The AIMS Trust is a registered charitable trust with tax exemption with the following appointed trustees: Professors Russell Botman, Fritz Hahne, Keith Moffatt, Brian O'Connell, Daya Reddy, Ben Turok and Neil Turok

Council

AIMS-SA is governed by a Council which includes representatives of each of the six partner universities. The AIMS Council met on 23 January 2013. Its current members are Professor Ramesh Bharuthrum (University of the Western Cape), Professor Hendrik Geyer (Stellenbosch University), Professor Daya Reddy (University of Cape Town), Professor Grae Worster (University of Cambridge), Professor Graham Richards (Oxford University), Dr Tsou Sheung Tsun (Oxford University), and Professor Stephane Ouvry (Université de Paris Sud XI), with Professor Neil Turok (Perimeter Institute) as Founder and Chair, and the Director of AIMS, Professor 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. It met on 25 October 2012. Its current members are Professor Edward Lungu (University of Botswana) as Chair, Professor Jacek Banasiak (University of KwaZulu-Natal), Professor Eugene Cloete (Stellenbosch University), Professor David Fisher (University of the Western Cape), Professor Barry Green (AIMS-SA), Professor Louis Labuschagne (South African Mathematical Society), Dr Sizwe



Mabizela (Rhodes University), Dr Peter Martinez (South African Institute of Physics), Dr Thandi Mgwebi (National Research Foundation) and Dr Sibusiso Sibisi (Council for Scientific and Industrial Research).

Executive Team

Professor Francis Benyah (University of the Western Cape), Dr Hannes Kriel (Stellenbosch University), Professor Nicola Mulder (University of Cape Town), Dr Rafiq Omar (University of the Western Cape), Dr Jesse Ratzkin (University of Cape Town) and Professor Ingrid Rewitzky (Stellenbosch University) served on the Executive Team for the period under review. Members of the team assist the Chair, Professor Barry Green, with the selection of students for the structured Master's and with DAAD applications as well as other tasks identified by the Chair. The Executive Team's additional role is to facilitate the relationship between AIMS and the three participating South African universities.



Staff

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

New staff members appointed this year were Nazeer Kamalie in September 2012 who joined the facilities team and Yasmin Hankel in January 2013 who joined as the New Media officer.

AIMSSEC is also expanding and new staff members were appointed. Ms Ingrid Mostert and Mrs Sinobia Kenny joined as temporary lecturers for part of the academic year. In June 2013, Dr Claire Blackman was appointed as a full-time Academic lecturer (this position is being funded by the UNESCO-Hamdani prize money) and Dr Rejoyce Gavhi joined as part-time lecturer.

A'eeda Rhodes and Rene January (Administration), Linda Camara (Communications), Liesl Felix (Finance), Waseem Elliot (IT), Fazley Jattiem and Emmanuel Kongolo (Facilities) and Najwa Chellan and Virgenia Davidson (AIMSSEC administration) continued in their positions.



Tutors

Visiting lecturers are invited to teach courses on the AIMS' Master's and the Honours programme (see page 4) and AIMS appoints a number of teaching assistants to assist them and the AIMS Directors. During the year under review the following teaching assistants were appointed: Alex Bamunoba (Uganda), Brenda Correa de Andrade Penante (Brazil), Emma Coutts (UK), Laila El Ghandour (Morocco), Adrian Janse van Vuuren (South Africa), Markus Kruger (South Africa), Nafiseh Rafiei (Iran), Holifidy Arisoa Rapanoel (Madagascar), Emile Chimusa Rugamika (Congo), Mekdes Tessema (Ethiopia) and Casey Wall (USA).

Danny Parsons a graduate from Warwick University, joined the AIMSSEC team as a Teaching Assistant in June, followed by Alice Taherzadeh, also a Warwick University graduate, who arrived at the end of July.

Frances Aron continued as the English and Science Communication Lecturer while Jan Groenewald also taught a number of IT-related courses.



Information technology

In the period under new the IT department's focus was on improved internet access, monitoring and notification, training, teaching, and creating installers for the AIMS-desktop software distribution.

An AIMS-TENET Shared Access Circuit was implemented, greatly improving AIMS' national connectivity. Traffic prioritisation and bandwidth management rules were updated to cater for this. AIMS is likely to continue pursuing direct SANReN connectivity to truly benefit from international cloud services and from high performance computing opportunities available at CHPC and SA-GRID.

Monitoring and notification was expanded to include many more services, devices, and supply levels. Other services including websites and the IPPBX were upgraded.

Waseem Elliott attended industry conferences and training: a Software Development with Python course at AIMS, Scaleconf 2013, and Afrinic IPv6 training.

New Media

There are two branches to nourish at AIMS-SA in terms of multimedia content. On the one hand, we have educational resource expansion, whilst on the other we have the development of the AIMS image presentation, information and marketing via visual and audio-visual material.

Exploring the educational sector, AIMS has started to share open educational resources. Currently these consist of courses, public lectures and sections of workshops, which are all interesting and accessible on the AIMS YouTube Channel (<http://www.youtube.com/user/AIMSacza>). The responses thus far have been very positive and we have started to share this with the other AIMS institutes and are looking into further distribution.

In terms of the second branch of development, image presence, AIMS has moved out onto a more public realm in social media than it has been in the past. This has enabled the network to reach outside of direct AIMS associates. Social media has been particularly useful for events and visits, in particular visits by politicians such as the visit by German Foreign Minister Dr Guido Westerwelle or the Climate Math

Courses in Computing and LaTeX, Ubuntu for Science, online collaboration, revision control, and the statistical modelling software R were taught to the AIMS-SA August and January Structured Master's intakes, as well as to AIMS-Ghana Master's students and visiting workshops.

Installations of Ubuntu with science software were also expanded on visitor's laptops. Live USB installers were created for both the Sage mathematical software and AIMS-desktop software distribution. Buildslaves were implemented at AIMS as part of the worldwide Sage software buildbot system.

AIMS-NEI was supported in work on migrating web servers on choosing a vendor for an Information Management System and on updating the New Centre IT Budget.



public lecture by Professor Inez Fung. During such important events there are now official event photos which are made available on the social network platforms.

Within the period under review, much care was taken in establishing this area of activity. AIMS-SA appointed a New Media Officer, Ms Yasmin Hankel and the modest equipment setup required for expanding educational resources and improving AIMS' image presence.

Facilities

In July and August 2012 the painting of the main AIMS-SA building was completed. September 2012 saw the addition of two new offices on the ground floor, and a cloakroom for kitchen staff, the foyer was re-carpeted, and a display cabinet added. In October and November extra parking bays were added at the St Claire and Watson Street residences. Since December 2012 the facilities team has been busy with fire compliance as per a Fire Department instruction. All other upgrades were put on hold.



AIMS-SA (R028)

Audited Financial Statement for the year ended 31 December 2012

	TOTAL	GENERAL OVERHEAD COSTS	Structured MSc PROGRAMME BURSARIES	ACADEMIC PROGRAMME	POST AIMS BURSARIES	HONOURS PROGRAMME BURSARIES	RESEARCH PROGRAMME	ENDOWED SCHOLARSHIPS	NEXT EINSTEIN INITIATIVE & AMINET	PRIOR YEAR 31/12/2011
TOTAL INCOME	18 945 982	5 209 628	3 619 266	6 000 000	3 323 290	75 000	500 000	218 799	-	17 881 315
Cambridge University Press	-	-	-	-	-	-	-	-	-	313 148
DAAD	1 613 082	-	-	-	1 613 082	-	-	-	-	1 695 340
Department of Higher Education (2012/13)	4 400 000	-	-	4 400 000	-	-	-	-	-	4 000 000
Department of Science and Technology	2 600 000	-	-	1 600 000	500 000	-	500 000	-	-	1 500 000
Friends of AIMS	23 000	-	23 000	-	-	-	-	-	-	40 510
Foreign Exchange Profit	2 350	2 350	-	-	-	-	-	-	-	1 041
Foundation Philanthropia	-	-	-	-	-	-	-	-	-	429 135
Give and Gain	4 131	-	4 131	-	-	-	-	-	-	17 391
IDRC	4 137 323	-	2 990 180	-	1 147 143	-	-	-	-	2 946 222
London Mathematical Society	-	-	-	-	-	-	-	-	-	166 251
Martin Rees (Endowed Scholarship)	85 000	-	85 000	-	-	-	-	-	-	82 000
Neil Turok	12 626	-	12 626	-	-	-	-	-	-	6 408
One for Many	308 907	-	308 907	-	-	-	-	-	-	1 015 667
SACEMA	75 000	-	-	-	-	75 000	-	-	-	132 500
Stephen Hawking (Endowed Scholarship)	85 000	-	85 000	-	-	-	-	-	-	82 000
Sundry Income	79 940	79 940	-	-	-	-	-	-	-	44 812
The Paul G. Allen Family Foundation (Endowed Scholarship)	85 000	-	85 000	-	-	-	-	-	-	80 000
The Victor Rothschild Memorial Fund	-	-	-	-	-	-	-	-	-	155 827
University of Bordeaux	63 065	-	-	-	63 065	-	-	-	-	-
Universite Paris Sud	-	-	-	-	-	-	-	-	-	178 482
Workshops and Conferences	788 184	788 184	-	-	-	-	-	-	-	1 224 367
Other Income: Contribution by Projects (Accom.& Admin Fees)	3 136 935	3 136 935	-	-	-	-	-	-	-	2 520 492
Other income: Contribution by AIMS-NEI	100 000	100 000	-	-	-	-	-	-	-	114 816
Other income: Contribution by Cost Centre: NRF	1 010 918	810 400	-	-	-	-	-	200 518	-	769 200
Other Income: Interest Received	335 522	291 820	25 421	-	-	-	-	18 281	-	365 708
TOTAL EXPENSES	21 910 529	6 653 716	5 208 768	5 821 527	2 927 417	175 050	572 063	232 589	319 400	18 985 945
Accommodation (General Overhead Levy)	2 116 935	-	1 556 775	283 142	-	76 500	200 518	-	-	1 590 492
Administration Fees (General Overhead Levy)	1 020 000	-	500 000	520 000	-	-	-	-	-	930 000
Audit Fee	26 961	-	26 961	26 961	-	-	-	-	-	25 080
Affiliation, Registration, Membership and Subscription Fees	156 562	-	146 380	10 182	-	-	-	-	-	124 601
Book and periodicals	145	145	-	-	-	-	-	-	-	9 370
Building, Building Refurnish Costs, Equipment & Furniture	478 342	452 695	-	-	-	-	-	25 647	-	620 990
Bursaries	3 197 417	-	-	-	2 927 417	-	-	170 000	-	2 979 000
Catering	3 038 444	912 729	1 485 347	425 670	-	72 550	142 148	-	-	2 637 231
Cleaning and Sanitation	25 671	25 671	-	-	-	-	-	-	-	29 203
Computer Materials	91 479	91 479	-	-	-	-	-	-	-	113 841
Consultation Fees and Services	549 389	-	-	549 389	-	-	-	-	-	419 829
Consumable Materials	347 313	347 313	-	-	-	-	-	-	-	264 298
Copying and Printing	57 134	57 134	-	-	-	-	-	-	-	48 403
Courses	111 400	-	-	111 400	-	-	-	-	-	26 400
Flowers and Gifts	8 274	8 274	-	-	-	-	-	-	-	7 946
Foreign Exchange Loss	850	850	-	-	-	-	-	-	-	3 238
General Office Expenses	17 436	17 436	-	-	-	-	-	-	-	6 415
General Vehicle Expenditure	280 176	280 176	-	-	-	-	-	-	-	183 327
Insurance	74 050	74 050	-	-	-	-	-	-	-	60 438
Internal Transfer of Funds	319 400	-	-	-	-	-	-	-	319 400	311 654
Internet Expenses	441 326	30 576	75 300	290 450	-	-	20 000	25 000	-	263 505
Medical Expenses	305 338	-	202 509	102 829	-	-	-	-	-	249 637
Municipal Expenses: Electricity,Rates, Refuse, Water	1 256 636	1 244 694	-	-	-	-	-	11 942	-	1 055 147
Photographic Materials	2 360	-	2 360	-	-	-	-	-	-	5 184
Postage	7 228	7 228	-	-	-	-	-	-	-	7 385
Remuneration	5 291 499	2 396 954	-	2 894 545	-	-	-	-	-	4 293 894
Repairs & Maintenance	226 186	226 186	-	-	-	-	-	-	-	193 240
Repatriation costs (students)	14 945	-	14 945	-	-	-	-	-	-	-
Security Services	16 229	16 229	-	-	-	-	-	-	-	12 624
Stationery	62 670	62 670	-	-	-	-	-	-	-	64 252
Student Stipends	739 805	-	713 805	-	-	26 000	-	-	-	636 781
Telephone and Cell Phone Costs	65 442	65 442	-	-	-	-	-	-	-	95 593
Travel Expenses	1 563 488	335 784	511 347	606 960	-	-	109 397	-	-	1 718 949
NET INCOME OVER EXPENDITURE	(2 964 547)	(1 444 088)	(1 589 502)	178 473	395 873	(100 050)	(72 063)	(13 790)	(319 400)	(1 104 631)
ACCUMULATED FUNDS AT 1 JANUARY 2012	7 516 429	294 995	2 347 871	3 560 368	738 153	(216 698)	92 338	580 402	119 000	8 621 060
FUNDS AVAILABLE AT 31 DECEMBER 2012	4 551 882	(1 149 092)	758 369	3 738 840	1 134 027	(316 748)	20 275	566 612	(200 400)	7 516 429

F MALJET
DIRECTOR: FINANCIAL SERVICES

Notes to the financial statement for AIMS-SA (Cost Centre R028) for the year ended 31 December 2012

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

Income

1. Fund received via AIMS-NEI from the IDRC and One for Many, for 50 structured masters' student bursaries for the period 1 January to 30 June 2012 (2011/2012 academic year) and for 53 structured masters' student bursaries for the period 1 July to 30 December 2012 (2012/2013 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. Funds received from Friends of AIMS are donations received from visiting lecturers at AIMS-SA, who have opted to donate their honoraria.
5. 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-SA with 2 structured masters' student bursaries per annum.
6. An endowed scholarship received from The Paul G. Allen Family Foundation provides AIMS-SA with one structured masters' student bursary per annum.

Expenses

1. All expenses shown for 2012 refer to actual costs directly attributable to the relevant AIMS-SA 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 stipendiaries, 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 2012, accumulated funds include earmarked funds as listed. Any project shortfalls are taken from existing funds available.



AIMS-SA RESEARCH CENTRE (27798)

Financial Statement for the year ended 31 December 2012

	31/12/2012	31/12/2011
	R	R
Income	2,636,119	782,804
NRF	2,500,000	500,000
Interest received	136,057	282,155
Foreign Exchange Profit	62	649
Expenses	4,664,468	3,887,175
Accommodation and Catering	113,335	57,225
Administrative Fees	145,200	132,000
Affiliation and Registration Expenses	9,290	6,360
Bursaries (Postdocs, PhD & MSc)	967,710	489,645
Consultation Fees	166,576	314,231
Consumables	113,983	94,660
Foreign Exchange Loss	23	986
Furniture & equipment	27,037	31,713
General Office Expenses	44,625	126,376
Internet	100,672	92,304
Medical Expenses	63,478	46,901
Printing and Stationery	91,199	68,492
Remuneration	1,864,020	1,539,768
Rent of premises	145,200	132,000
Special Events and conferences	294,235	186,455
Travel Expenses	517,885	568,059
NET INCOME/(SHORTFALL) OVER EXPENDITURE	-2,028,349	-3,104,371
ACCUMULATED FUNDS AT 1 JANUARY 2012	3,556,215	6,660,587
FUNDS AVAILABLE AT 31 DECEMBER 2012	1,527,866	3,556,215

F Majlet

Director: Financial Services

**Notes to the financial statement for the AIMS-SA
RESEARCH CENTRE (Cost Centre 27798) for the year
ended 31 December 2012**

1. Accommodation and catering costs refer to costs for visiting researchers, postdoctoral fellows, doctoral and Master's 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. Furniture and equipment includes the further acquisition of computers and furniture in order to accommodate an increase in researchers, visiting researchers and students at the Research Centre.
4. Medical expenses refer to medical costs for visiting researchers, doctoral and Master's students for the duration of their stay at AIMS.
5. 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.



AIMSSEC – R268

Financial Statement for the year ended 31 December 2012

	<u>31/12/2012</u>	<u>31/12/2011</u>
	R	R
INCOME	4,714,585.44	3,416,790.60
Donations		
Datatec Education and Technology Trust	284,171.00	284,171.00
Give and Gain	-	5,885.58
Hamdan Prize	95,409.63	-
Nuffield Foundation	-	181,222.50
Old Mutual Foundation	246,790.00	200,270.00
Rand Merchant Bank Fund	500,000.00	500,000.00
Sankhyaa Ltd (Heymath!)	-	29,965.07
St John's College, Cambridge	11,915.50	10,903.00
University of Cambridge (Mobile Maths)	-	11,127.70
Victor Rothschild Memorial Fund	319,400.40	-
Zenex Foundation	559,092.00	614,654.00
Other income: Sundry	6,229.08	109,340.33
Other income: Sundry cash back	14,870.46	19,770.00
Department of Education: Eastern Cape	2,578,060.00	1,349,275.00
IMSTUS	53,348.00	79,456.00
Foreign Exchange Profit	117.36	5.60
Interest Received	45,182.01	20,744.82
EXPENDITURE	4,048,737.80	2,785,880.63
Accommodation and Catering	882,395.55	653,917.60
Advertising	30,097.32	-
Affiliation and Registration Fees	590.00	-
Books	3,606.00	-
Bursaries	1,186,900.00	519,225.00
Consultation Fees and Services	33,741.12	29,468.68
Consumable Materials	19,651.62	4,353.45
Foreign Exchange Loss	307.40	534.57
General Office Expenses (incl. stationery packs)	55,247.61	39,456.02
IT Services (Telematic and course IT)	126,833.05	65,912.52
Postage	33,460.26	13,089.15
Remuneration	807,770.72	755,424.31
Rent of Rooms	66,794.80	64,262.10
Services	59,470.52	102,976.18
Smaller Furniture and Equipment	-	11,808.05
Travel Expenses	741,871.83	525,453.00
NET INCOME OVER EXPENDITURE	665,847.64	630,909.97
ACCUMULATED FUNDS AT 1 JANUARY 2012	965,652.55	334,742.58
FUNDS AVAILABLE AT 31 DECEMBER 2012	1,631,500.19	965,652.55

SIGNED.....

Ms F Majiet
Head: Financial Services

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AIMS-SA donors

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Wong-Avery

AIMS-SA 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:

Datatec Educational and Technology Trust
Department of Higher Education and Training
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Victor Rothschild Memorial Fund
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African Institute for Mathematical Sciences

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