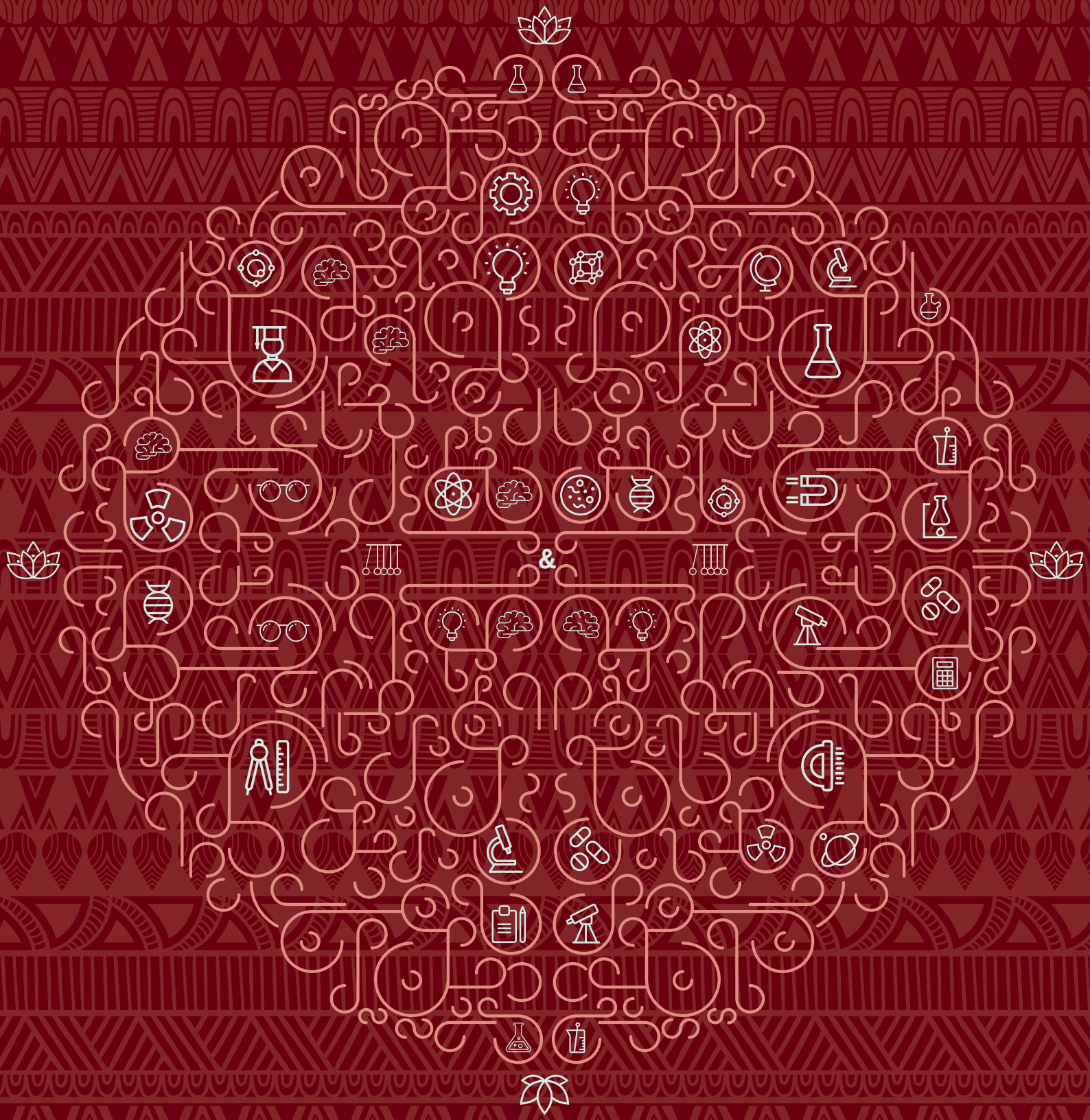
AIMS | African Institute for Mathematical Sciences



GROWING AFRICA THROUGH MATHEMATICAL SCIENCES

ANNUAL REPORT JULY 2014 - JUNE 2015

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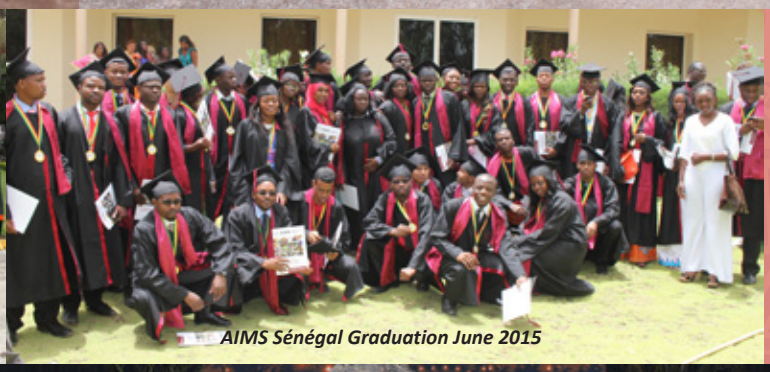

AIMS Sénégal Graduation June 2015

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MESSAGE FROM THE CHAIR OF THE BOARD

Can Africa's problems be solved through mathematical science?

On a continent where many people still lack basic necessities like food, clean water and medicine it may seem like an outlandish proposal that maths and science should be a priority. However, in the long view of history, these fields have served as the foundation of modern society because they underlie every technology – from plumbing to planes, smartphones to satellites. In the same vein, nurturing its own technical experts, pioneers and innovators is exactly the catalyst that Africa needs, to take advantage of today's opportunities and overcome its greatest challenges.

"... IF AIMS CONTINUES TO GROW FROM STRENGTH TO STRENGTH, AND GENERATES THOUSANDS OF TALENTED YOUNG SCIENTISTS, ITS IMPACT ON AFRICA'S DEVELOPMENT WILL BE HUGE."

This is the motivation behind AIMS, a network of training centres across the continent created to empower brilliant young Africans to become agents of change through advanced maths and science.

AIMS is a pan-African initiative. There are five centres so far, in Sénégal, Cameroon, Ghana, Tanzania and South Africa, with plans to open another in Rwanda in 2016. We are so very proud of the AIMS team, under the leadership of Thierry Zomahoun and his colleagues at Secretariat, and of all the centre and international staff who have made AIMS' rapid growth possible. The opportunities ahead are growing daily, as more and more people realise the tremendous benefits of building a network of AIMS centres, bringing the continent's youth together and enabling them to become leading-edge scientists able to work together and solve relevant problems.

At every centre there is a highly motivated, pan-African student body. Their common interest in maths, science and the future of Africa, allows the students to transcend the cultural and other differences that have historically divided their peoples. Visiting an AIMS centre is always an amazing experience, to feel the enthusiasm, the hope and the commitment of the students, and to see how Africa's diversity is a continual source of strength, ideas and energy.

As of July 2015, AIMS has 960 graduates, at Master's level and above, 31% women from 42 African countries. We eagerly anticipate graduating our 1000th student in the coming year.

We are aiming high – as our slogan says: the next Einstein should be African. Our challenge is to ensure that the quality of our training, research and educational outreach programs, and all of our efforts to support those at every AIMS centre, are excellent and constantly improving. Only the best should be acceptable for AIMS, and for the future of Africa.

Our centres don't just train brilliant young Africans in Africa. They also serve as a magnet attracting those who have studied abroad back to Africa, to work as scientific researchers. Our Research Chair Program is gaining momentum, with a number of Junior and Senior Chairs already in place and more planned.

Plans are also well underway for the hosting of the Next Einstein Forum in Sénégal in March 2016. Over 500 bright scientific minds and international leaders will gather for the inaugural event organised by AIMS. The three-day summit will highlight emerging scientific and technical talent, and fuel collaboration which puts this talent to work in the cause of human development.

The problems facing Africa are complex and there are no easy answers. But if AIMS continues to grow from strength to strength, and generates thousands of talented young scientists, its impact on Africa's development will be huge. As we've learned many times in science, the hardest and most intractable problems are often the ones that eventually yield the most important – and the most wonderful – solutions.

Sincerely,
Neil Turok

HIGHLIGHTS

A memorandum of understanding (MoU) signed between AIMS and the Government of Tanzania and the first cohort of students started classes at **AIMS Tanzania** in October 2014.

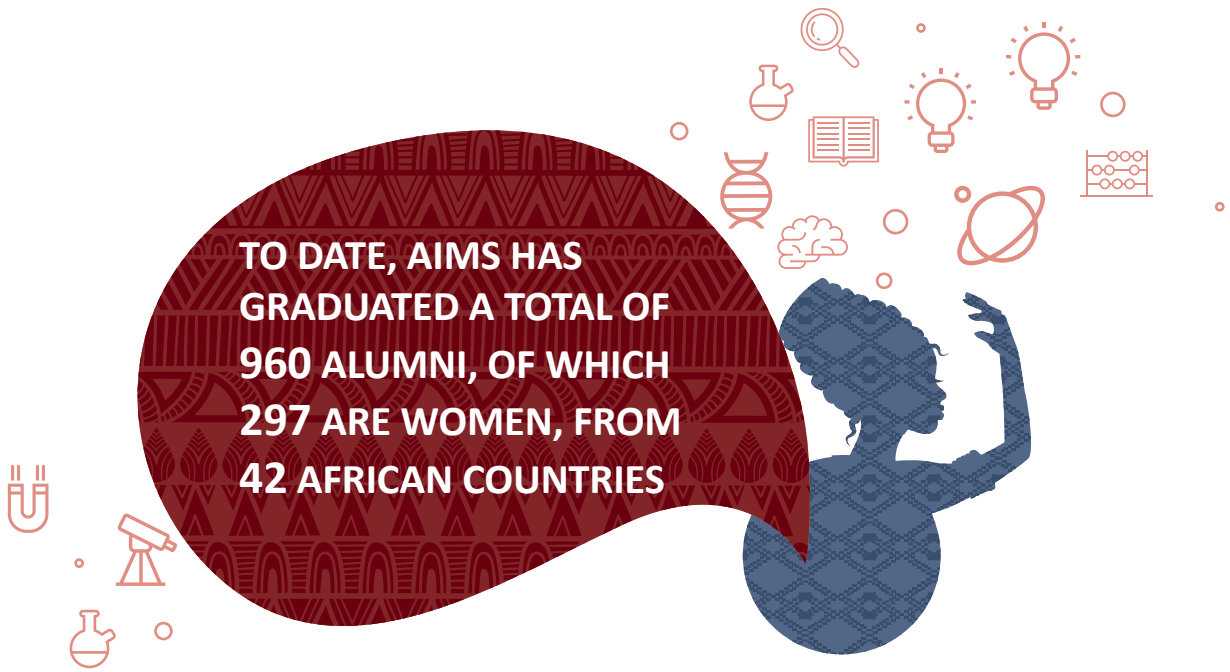
Hosting of Africa's first **AIMS – IMAGINARY** math's exhibition and workshop at AIMS South Africa in November 2014.

On 16 March 2015, AIMS signed a MoU with the **Forum for African Women Educationalists** (FAWE), a leading pan-African organisation dedicated to girls and women's education across Africa.

The **African Union Commission** (AUC) and AIMS signed a Memorandum of Understanding (MoU) on 30 June 2015, to strengthen the teaching and learning of Science, Technology, Engineering and Mathematics (STEM) in Africa.

AIMS received a total of **2,684 applications** for the upcoming 2015/2016 Master's program. This represents a 120% increase in applications received over last year.

AIMS has facilitated a total of **25 internships** across Africa to its students and alumni in the IT, finance, health, consulting, and waste management fields.



LAUNCH OF THE AIMS MASTERCARD FOUNDATION SCHOLARS PROGRAM.

The $25 million partnership with The MasterCard Foundation will enable the following over the next five years:

- Comprehensive scholarships (full bursaries) to talented African university graduates - one third of whom will be women - at AIMS' Centres of Excellence.
- An 18-month Co-operative Master's Program for 86 Scholars piloted at AIMS Sénégal.
- Giving Back: All students will be expected to volunteer a portion of their time in their Centre's host community to build their leadership skills, while also strengthening their sense of responsibility to give back to Africa.
- Secondary school teacher training in Cameroon: aimed at building and strengthening the pipeline for STEM at the secondary level, this pilot initiative will be directed at both pre- and in-service teachers and will promote gender responsive pedagogy, to engage more girls in STEM education.

MESSAGE FROM THE PRESIDENT & CEO

AIMS is very proud to be an active participant in the development of Africa, both by providing much needed scientific and technological human resources but also by calling stakeholders in public and private sectors to action. I am pleased to share with you the AIMS - Next Einstein Initiative (AIMS-NEI) Annual Report for 2014-2015.

This year, we saw our first cohort of students graduate from AIMS Tanzania, and 212 students graduated across the AIMS network, including 51 women. Our graduates, I have no doubt, will go on to mould the continent for the better, in academia, research, industry and the public sector, influencing policy and creating an enabling environment for future African Einsteins over the next generations.

We at AIMS are also delighted that President Paul Kagame of Rwanda has enthusiastically endorsed AIMS and the rapid implementation of the AIMS Rwanda proposal is well underway. The proposal is estimated at $60 million over five years and AIMS Rwanda is set to open in August 2016.

In May, an agreement was signed with Michigan State University, which provides a financial investment, faculty lecturers and researchers to support training and discovery at our newest centre in Tanzania. The official launch of the 5 year $25 million partnership with The MasterCard Foundation was held on 4 June 2015 at a panel discussion that took place on the fringes of the World Economic Forum (WEF) on Africa held in Cape Town, South Africa. The discussion focused on why and how STEM education and research needs sustained investment for Africa to reap the benefits of a scientific revolution. The partnership will provide scholarships for students at AIMS centres, a pilot co-operative education program at AIMS Sénégal, teacher training at AIMS Cameroon and support for our women in science initiatives.

On the public engagement front, AIMS played an influential role at the first Gender Summit on the continent in April. A delegation led by AIMS Executive Vice President, Dr Dorothy Nyambi, included several alumni and shared AIMS' approach to gender. The Gender Summit came on the heels of the signing of an important Memorandum of Understanding with the Forum for African Educationalists (FAWE), a key partner in delivering on our targets to increase the pipeline of girls going into mathematical sciences and STEM more broadly. On 30 June 2015, AIMS and the African Union Commission (AUC) signed a Memorandum of Understanding aimed at strengthening the teaching and learning of Science, Technology, Engineering and Mathematics (STEM) on the African continent.

"OUR GRADUATES, I HAVE NO DOUBT, WILL GO ON TO MOULD THE CONTINENT FOR THE BETTER, IN ACADEMIA, RESEARCH, INDUSTRY AND THE PUBLIC SECTOR, INFLUENCING POLICY AND CREATING AN ENABLING ENVIRONMENT FOR FUTURE AFRICAN EINSTEINS OVER THE NEXT GENERATIONS."

The Next Einstein Forum (NEF)'s momentum continued unabated with its second International Steering Committee (ISC) meeting held in October 2014, where members provided strategic direction on NEF's upcoming programs. October also saw the launch of the NEF Fellows Program with a call for applications that received nearly 100 applications from highly qualified young scientists from all parts of Africa. In January 2015, the NEF held the first meeting of the distinguished Scientific Program Committee who selected the first class of NEF Fellows and provided direction for the NEF as a global scientific platform as well as the Global Gathering agenda. The second call of NEF Fellow applications was launched in June. I was very excited to see the diversity of regions, scientific and technical disciplines in applications as well as the growing pool of female applicants. I eagerly anticipate the Global Gathering which is to be held in Dakar, Sénégal in March 2016.

We are grateful for your generous contributions and on behalf of AIMS staff, students and alumni, let me convey my sincere appreciation for your support.

Sincerely,
Thierry Zomahoun

TRAINING

AIMS MASTER'S

212 students (including 51 women) graduated from the AIMS Centres in South Africa, Sénégal, Cameroon, Ghana and Tanzania this year.

INTERNATIONAL LECTURERS

During the period under review there were a total of 133 lecturers across the AIMS network from 34 different nationalities. Of these 85 were from 20 countries outside of Africa.

POST-AIMS BURSARIES

To further enable its alumni to pursue academic studies post-AIMS, AIMS made available a number of post-AIMS bursaries funded by IDRC. 59 bursaries including 11 for women were awarded.

AIMS MODEL

The AIMS "live together-learn together" model promotes gender equality through close collaboration between women and men students.

INTERNSHIPS

Through internships and co-op placements, AIMS enhances the competencies of students and graduates, providing the opportunity to gain real world experience with international and local partners. This year AIMS facilitated the placement of 9 internships.

AIMS CO-OP MASTER'S

Starting in August 2015, AIMS, in partnership with The MasterCard Foundation Scholars Program, is piloting a one and a half year Co-operative Master's program at AIMS Sénégal.

AIMS ALUMNI

AIMS alumni continue to achieve success in their academic and professional pursuits following graduation from AIMS.

Five alumni currently hold senior leadership positions in Africa as Research Chairs, Founders and Managing Directors, and Research Scientists in their respective fields.

AIMS alumni have received numerous accolades for their research in STEM, including awards and fellowships, peer-reviewed publications, and patents.

To date, a total of **nine** alumni have received awards and fellowships for their contribution to advancing research in STEM at the Master's, PhD and Postdoctoral levels.

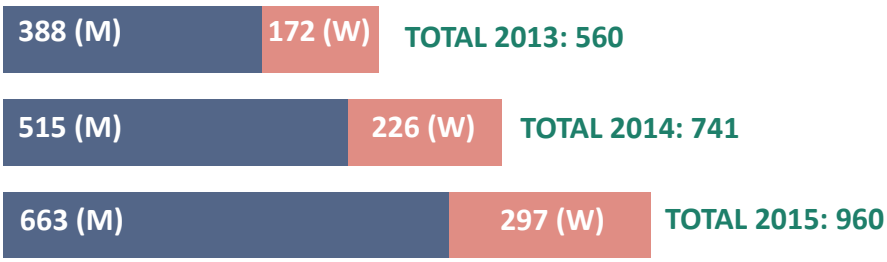
AIMS alumni have produced a total of **288** peer-reviewed publications to date; of these, **11** publications were produced this reporting period. AIMS alumni have published in a wide range of peer-reviewed journals showing a diverse application of mathematical sciences, including cosmology, infectious disease control, ICT, genetics, cryptography, climate change, and energy.

AIMS alumni are contributing to the development of Africa, both on and off the continent.

247 AIMS alumni are working in sectors in-line with Africa's development priorities, in particular education, finance and information and communications technology (ICT).

Seven AIMS alumni are currently pursuing entrepreneurial solutions to Africa's development challenges by founding private and non-profit companies in waste management, food production, finance, education and research.

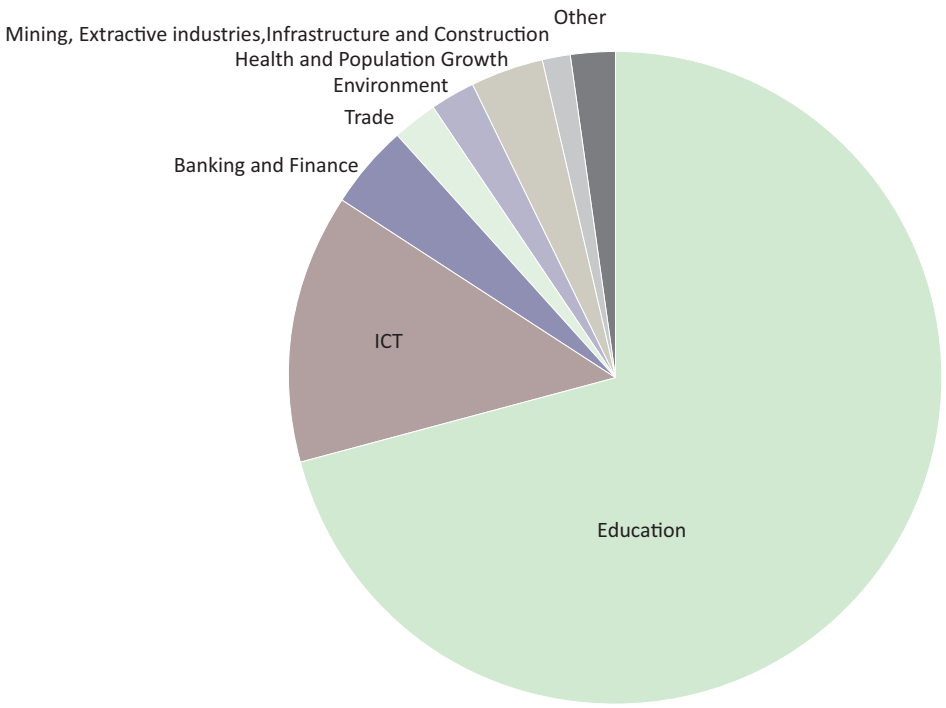
ALUMNI TOTAL BY YEAR



ALUMNI TOTAL BY CENTRE

AIMS ALUMNI	WOMEN	MEN	TOTAL
TOTAL	297	663	960
AIMS CENTRE			
AIMS SOUTH AFRICA	189	389	578
AIMS SÉNÉGAL	44	119	163
AIMS GHANA	32	74	106
AIMS CAMEROON	20	56	76
AIMS TANZANIA	12	25	37

AREAS OF DEVELOPMENT



USING MATHEMATICAL SCIENCES TO DEVELOP SOLAR ENERGY SOLUTIONS FOR AFRICA

MS ALICE IKUZWE (RWANDA), AIMS 2012

Since graduating from AIMS in 2012, Alice Ikuzwe went on to obtain a Research Master's in Mechanical Engineering (Mechatronic) from Stellenbosch University where her thesis in "Modelling, Design, Construction and Installation of a Daylighting System for Classroom in Rural South Africa" served to lay the foundation for her PhD. Alice is currently pursuing a PhD in Mechanical Engineering specialising in solar energy systems and renewable energy at the University of Pretoria, South Africa.

Alice's research interests are in solar energy and how it can be harnessed for lighting systems.

The International Energy Agency estimates that 585 million people in Sub-Saharan Africa lack access to electricity, with the electrification rate as low as 14% in rural areas. This is despite an abundance of solar energy in the continent, which has huge potential as a valuable source of untapped energy.

As a result of her research in this field, Alice has secured a patent in solar light reflectors. Together with Prof. AB Sebitosi at Stellenbosch University, Alice has developed an innovative light collimator designed to enhance the amount of light captured and transported through tubular skylights. This improved light tube design offers more illuminance in buildings for substantial energy savings while increasing occupants' productivity and comfort. The innovation is currently installed in one classroom at the Sustainability Institute in Lynedoch, South Africa. (The research paper can be viewed here http://www.sciencedirect.com/science/article/pii/S0038092X15000687)

"I AM USING MY SKILLS AND KNOWLEDGE IN MATHEMATICAL SCIENCES TO DEVELOP ENERGY EFFICIENT LIGHTING SOLUTIONS AND HELP INCREASE ACCESS TO ENERGY AMONG THE POOR AND DISADVANTAGED IN AFRICA."

AIMS MASTER'S PROGRAM 2015/2016 STUDENT INTAKE

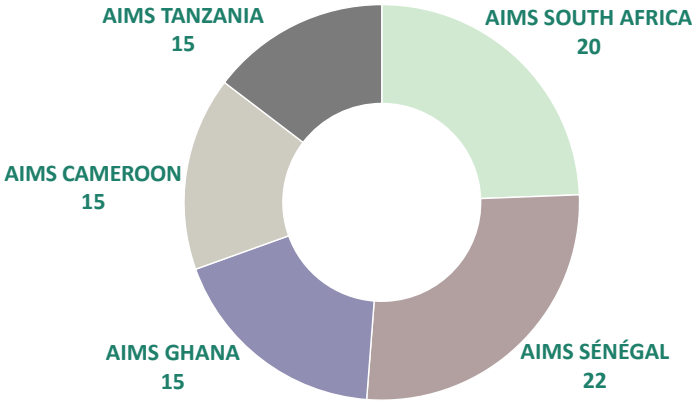
AIMS received a total of 2,684 applications (2,266 men, 418 women) for the August intake of its 2015/2016 Master's program from 45 countries across Africa.

This represents a 120% increase in applications compared to the number of applications received for the 2014/2015 academic year. Of the 2,684 applications received 1,458 (1,232 men, 226 women) were complete and classified as viable.

A total of 276 students were accepted to AIMS for the 2015/2016 academic year. Of this total 255 (including 81 (31%) women) took up the offer.

This was also the first year a subset of students were selected as MasterCard Foundation Scholars. These Scholars in addition to their academic qualifications to be admitted to AIMS centres, have demonstrated exceptional leadership potential, a strong commitment to giving back to their communities and most of them come from disadvantaged backgrounds. In total, 82 students, including 59 women, from 21 countries were selected.

DISTRIBUTION OF THE MASTERCARD FOUNDATION SCHOLARS AT AIMS CENTRES



CO-OPERATIVE MASTER'S PROGRAM

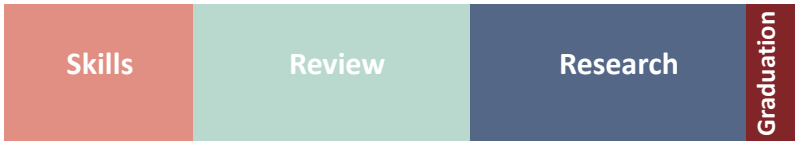
AIMS, in partnership with The MasterCard Foundation Scholars Program, is piloting a one and a half year Co-operative Master's program at AIMS Sénégal. Co-operative Education, or Work-Integrated Learning (WIL), is an approach to education that integrates class-based learning into an authentic, work-based context. It is a professional stream within the existing Master's program that provides students with a combination of academic training at AIMS and 'hands-on' work experience in a professional work environment enabling them to develop valuable work skills and successfully transition from school to progressive careers. The program supports women in preparing for successful careers in male-dominated STEM fields through exposure and interaction with successful women in industry.

A total of 12 students (2 women) were selected for the 2015 pilot intake. The eight months of placements will be at private sector companies in the Big Data and Computer security fields.

The Curriculum Design Committee of the AIMS Co-op pilot program in Sénégal has designed courses that specifically prepare students with knowledge and skills in the two selected industry areas. The committee included representatives of the local private sector and academia to ensure a curriculum of high relevance to the Big Data and Computer Security industries.

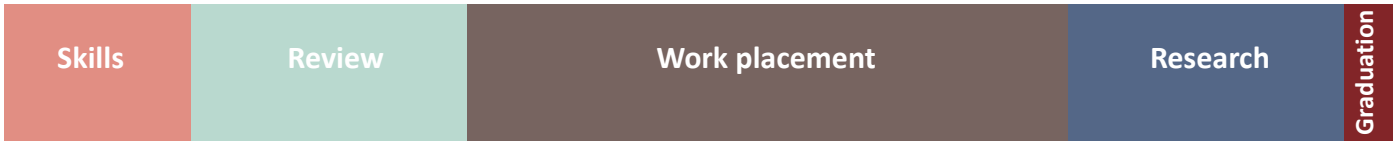
MASTER'S PROGRAMS

AIMS MASTER'S PROGRAM



10 months

AIMS CO-OP MASTER'S PROGRAM



18 months

GENDER EQUALITY AND INCLUSION

AIMS is committed to promoting gender equality and inclusion in mathematical sciences across Africa. In an effort to enhance results in this area, more strategic and coordinated in its approach a Director of Gender Equality and Inclusion was appointed to lead and grow this department. The mandate includes closing the gap for women's participation and leadership in mathematical sciences, engaging men and boys in challenging gender stereotypes in mathematical sciences, and ensuring equal access to quality mathematical sciences education for African women and men, in all their diversity.

AIMS undertook a number of gender equality and inclusion activities which collectively resulted in increased awareness and understanding of the importance of gender equality and inclusion across the AIMS Network. Collaboration and partnerships with organisations that promote women and girls in STEM, increased profiling of AIMS alumni and AIMS as a leader in gender equality and inclusion in STEM across Africa all experienced growth as a result of senior leadership.

These activities have been instrumental in building understanding, awareness and buy-in for gender equality and inclusion across the AIMS Network.

Key gender equality and inclusion activities planned for the future include: the launch of the AIMS Africa women in STEM Initiative at the NEF; establishing a network-wide gender working group; training and orientation for the new Program Officers at the Centres; gender strategy development; targeted outreach activities to girls; gender equality integrated into the co-op partner orientation and the curriculum for the teacher training program.

AIMS DEVELOPED AWARENESS AND CAPACITY THROUGH GENDER EQUALITY AND INCLUSION TRAINING FOR AIMS STAFF AND STUDENTS:

- AIMS-NEI Global Secretariat and AIMS South Africa staff (February 2015)
- AIMS Senegal staff (March 2015)
- AIMS Cameroon staff and students (March 2015)
- AIMS South Africa students, including a presentation by a visiting expert on gender and epidemiology (June 2015).

AIMS HAS INITIATED DISCUSSIONS WITH THE FOLLOWING GENDER EQUALITY PARTNERS:

Campaign for Female Education (CAMFED), (COACh), working to advance Sciences and Technology for African Women (WAAW) and signed an MoU with the Federation of Africa Women Educationalists (FAWE) in March 2015.

AIMS PROMOTED ROLE MODELS AND MENTORING FOR WOMEN AT AIMS AND EXTERNALLY

- In January 2015, AIMS South Africa hosted a delegation from TechWomen, who spoke to female students about the challenges facing women in science and about mentoring programs for women scientists.
- In April 2015, AIMS South Africa launched its first student-led women's mentoring program with AIMS South Africa postdoctoral fellow Dr Mpfareleni Rejoice Gavhi who spoke to AIMS South Africa women students about her area of specialty and about her experience. She advised as an African woman who chose to pursue education in mathematical sciences.
- In July 2015, Maurine Atieno Songa (AIMS 2009 Alumni) participated in the WAAW STEM Girls Camp in Nairobi, Kenya. She spoke to 13-17 year-old secondary school girls with the aim of exposing girls to mentors who could help them explore the many STEM career options available in Africa.

AIMS PARTICIPATED IN CONFERENCES AND WORKSHOPS ON WOMEN IN SCIENCE:

- In April 2015, a delegation of 12 AIMS alumni and 5 AIMS-NEI staff participated (panellist, AIMS booth, volunteers), in the Gender Summit Africa which was held in Cape Town. The theme for the Summit was 'Poverty Alleviation and Economic Empowerment through Scientific Research and Innovation: Better Knowledge from and for Africa'.
- In July 2015, Sinobia Kenny (AIMSSEC) delivered a presentation at the workshop entitled 'Women in Mathematics for Social Change and Sustainable Livelihoods", which was organised by the African Mathematical Union Commission for Women Mathematicians in Africa (AMUCWMA / AMWA) in Naivasha, Kenya.

AIMS TRAINED PARTNERS ON THE IMPORTANCE OF GENDER EQUALITY AND INCLUSION:

In March 2015 a discussion was held on gender equality with student teachers at l'Ecole Normale Supérieure in Yaoundé, Cameroon as part of the MasterCard Foundation Teacher Training Program.

FIGHTING DISEASE USING MATHEMATICAL MODELLING

DR TENDAI MUGWAGWA (ZIMBABWE), AIMS 2004

"AIMS CHANGED MY VIEW OF SCIENCE. BEFORE, I USED TO SEE MATHEMATICS AS A SET OF PROBLEMS THAT NEEDED SOLVING, BUT NOW IT IS A SET OF TOOLS THAT I CAN USE TO SOLVE OTHER LIFE PROBLEMS."

Dr Tendai Mugwagwa's passion for health sciences dates back to early childhood. For her undergraduate studies she majored in mathematics and biology. After arriving at AIMS in 2003 she was introduced to the field of biomathematics which married her knowledge in mathematics and biology. In addition she also gained valuable skills in programming and problem solving.

With these skills, Tendai continued to study biomathematics with particular interest in HIV infection, completing a Master's in Applied Mathematics from the University of Cape Town in 2005. She went on to complete a PhD in theoretical immunology from the University of Utrecht in the Netherlands. Tendai then spent a year as a postdoctoral fellow at the University of Rochester medical centre. She spent a further two years as a research associate at Imperial College London where she moved into the field of Tuberculosis epidemiology and health economics. Currently, Tendai is an infectious disease modeller for Public Health England (PHE) and a visiting Research fellow at Imperial College, London. At PHE, Tendai develops mathematical models that are used in the design and evaluation of tuberculosis control strategies with particular focus on social groups with limited access to health care. Her work helps inform public health policy and improve health practices.

As a way of giving back to AIMS, Tendai approached AIMS Alumni Dr Angelina Lutambi and Dr Martial Loth Ndeffo Mbah, who are both doing research in epidemiology, with the idea of developing an AIMS review course title 'Epidemiology of Infectious Diseases'. The course draws on their experience in the field of epidemiology as well as their experience with the AIMS style of learning. Its goal is to provide students with a broad view of the field of mathematical epidemiology and its importance for research and public health decision-making.

The course has been taught at AIMS South Africa in 2014 and AIMS Tanzania in 2015. In 2016, they plan to teach the course at AIMS Cameroon. Tendai has also tutored at AIMS South Africa and has supervised a Master's student research project at AIMS Tanzania.

CAREER SKILLS, EMPLOYABILITY AND ENTREPRENEURSHIP

To enhance the employability of our alumni, the AIMS career development strategy was developed to strengthen the Master's program. Implementation of this strategy will contribute to increase the awareness of alternative opportunities to careers in academia, research or industry that can impact policy, business development and economic stimulus for students.

A career, employability and entrepreneurship (CEE) module was finalised and implemented in four of the centres.

The module provides students with the skills and tools necessary to explore various career paths, and identify employment, entrepreneurial and business-building opportunities after they graduate.

Activities include entrepreneurship training, panels and talks from industry representatives, workshops on business plan development, CV writing, interview skills and career planning, and skills development regarding addressing sector-based problems through mathematical modelling.

International Business school lecturers (UK and USA) gave the courses during this first implementation year for the comprehensive CEE curriculum. For the next academic year, the plan is to include local business leaders or local business school lecturers to jointly deliver the course.

Initiated by AIMS Sénégal, the E-Club is a platform through which AIMS students are introduced to career options within private sector.

It is designed to introduce the practical application of mathematics and its potential as a tool for optimizing different areas and components of a business enterprise. E-Club offers the students a platform for regular practice that builds their soft professional skills on an ongoing basis. In addition, the E-Club took the lead in organising celebrations for Women Entrepreneurship Day on 19 November 2014. This included a digitally facilitated panel discussion among women students from AIMS Cameroon and AIMS Sénégal on the

2014 Entrepreneurship for Scientists and Engineers Workshop

Explore the Financial Market with Maths Workshop

theme "Entrepreneurship and Mathematics for Women: Challenges and Opportunities in Africa."

AIMS Ghana organised the 2014 "Entrepreneurship for Scientists and Engineers Workshop."

This workshop was held from 14 to 19 July in partnership with the Institute of Physics. The workshop focused on building the entrepreneurial skills of scientists and engineers that would accelerate the commercialisation of their scientific inventions.

AIMS South Africa facilitated the "Explore the Financial Market with Maths Workshop."

This was held from 24 to 28 November 2015. Participants were introduced to essential concepts and instruments used in finance. They were exposed to computing skills and shown how to use them to analyse financial data, design portfolios and hedge against losses. Theoretical sessions were followed by practical lab sessions.

To promote women in entrepreneurship, AIMS is collaborating with women-led and run organisations.

One such organisation is the Jigguene Tech Hub, in Sénégal, which was created by a group of tech-savvy women entrepreneurs, who are using it to teach other women how to thrive in the technology industry. Partnering with AIMS, Jigguene Tech Hub provides an enabling and motivating space for AIMS' women students to be inspired by real life examples of successful women in business who they can relate to and learn from.

EXPOSURE TO INDUSTRY IS KEY IN DEFINING THE DIFFERENT OPPORTUNITIES AND PATHWAYS AIMS GRADUATES MAY PURSUE.

AIMS | African Institute for Mathematical Sciences
INDUSTRY INITIATIVE

AIMS continues to work towards increasing the transition of its graduates from school to work through internships and co-op placements.

In January 2015, the AIMS Industry Initiative Director was appointed in order to bring the strategic leadership and dedicated focus to this area. The scope of the AIMS Industry Initiative was reviewed and expanded.

The key objectives of the AIMS Industry Initiative going forward will be to:

- support AIMS alumni to achieve their desired post-graduate career paths, in academia, private sector, government, non-profit, research or small business;
- cultivate well-networked and influential AIMS alumni; and
- facilitate and nurture AIMS alumni to achieve their potential as leaders and change agents in Africa.

A total of nine internships were facilitated by AIMS in tthe past 12 months. Of the 25 internships facilitated by AIMS since January 2010 (cumulative), a total of nine internships have resulted in full-time employment in the company they interned at.

AIMS Alumni, Rebecca Juma (AIMS 2014) and Katiso Seeiso Letsi (AIMS 2014) were awarded the Kofi Annan Fellowship to attend the ESMT (European School of Management and Technology) located in Berlin, Germany.

DREAM TO BECOME AN ENTREPRENEUR TO HELP SOLVE PROBLEMS OF POVERTY AND UNEMPLOYMENT

MS REBECCA JUMA (KENYA), AIMS 2015

After graduating from AIMS Ghana in June 2015, Ms Rebecca Juma was one of two AIMS Alumni to be awarded the Kofi Annan Fellowship to attend the ESMT (European School of Management and Technology) located in Berlin, Germany.

"My family and friends have always encouraged me to pursue an academic path in mathematical sciences and believed in my abilities but the main challenge in pursuing a tertiary degree in my community was the lack of funds to pay school fees. I overcame this challenge by taking a student loan to pay for my undergraduate studies and applying for a scholarship for my Master's studies."

Rebecca chose to study mathematical sciences because she believed that it would help her develop professionally. "AIMS has helped me to achieve my goals by helping me develop better communication skills through the presentations we did. I have better analytical and problem solving skills, and can manage my time better."

"AT AIMS THE PROPORTION OF WOMEN TO MEN WAS APPROXIMATELY ONE THIRD, WHICH IS THE BIGGEST PROPORTION IN ALL THE STEM CLASSES THAT I HAVE EVER TAKEN PART IN."

She would like to be an entrepreneur so that she can contribute to society by providing job openings to help solve the problems of unemployment and poverty. She would also like to become a role model by encouraging girls to study STEM subjects and believes that governments should form partnerships with universities to encourage gender balance.

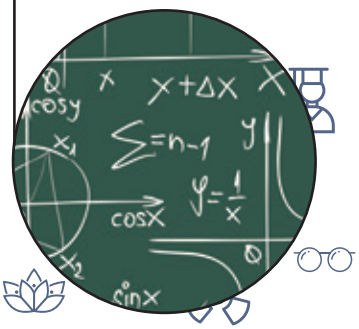
Rebecca believes that gender equality is improving as can be seen by the fact that there are more women leaders in her home country and worldwide compared to the past. But she notes that although there are still fewer women in STEM fields, the proportion is growing as women are being encouraged to pursue careers in STEM.

RESEARCH

AIMS research contributes to Africa's challenges, local and global strategic initiatives and is focused on the following areas:

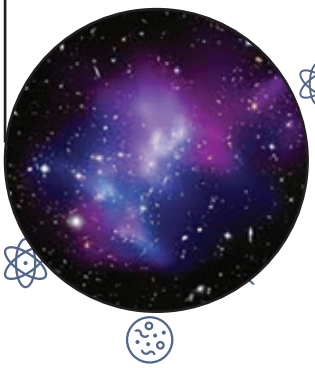
MATHEMATICS, TOPICS FROM GEOMETRY, ALGEBRA, NUMBER THEORY AND ANALYSIS

Backbone of applied mathematics or pure and applied science



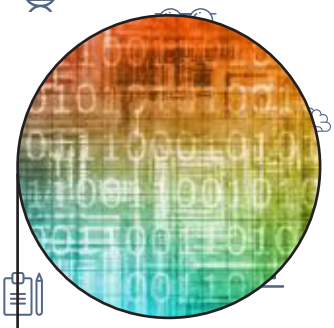
COSMOLOGY AND ASTROPHYSICS

Observational Cosmology, Big data, machine learning



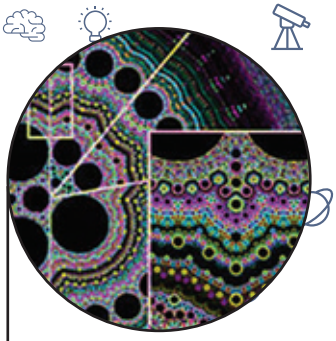
FINANCIAL MATHEMATICS

Financial applications of Levy Processes, American options, pricing stock markets



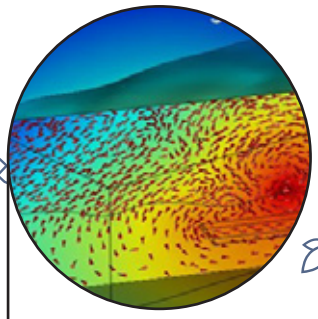
MATHEMATICAL FOUNDATIONS AND SCIENTIFIC COMPUTING

Analysis of information systems, Approximation, Cryptography, Data Security



BIOMATHEMATICS, MATHEMATICS AND PHYSICAL BIOSCIENCES

Infectious disease modelling (Ebola, HIV), Biodiversity, Maternal and child health



GEOMATICS AND HYDROGEOMATICS

Oil reservoirs, subsurface energy recovery

RESEARCH PROGRAMS

Facilitating high quality research with practical applications to address African development challenges is one of the three pillars of AIMS' model. Each centre engageS in relevant, multi-disciplinary research and researchers are given the opportunity to conduct their work surrounded by peers in a research environment designed to inspire innovation and creativity.

AIMS students and alumni are also given the opportunity to interact with researchers through their research projects, AIMS Alumni Small Research Grants, and various research-related workshops.

Three active AIMS Research Centres have already been launched across Africa – South Africa, Sénégal and Ghana. Research at these centres is led by Research Chairs through the AIMS Research Chair program, and senior researchers. The research done by other academic staff such as the Academic Directors/Managers at the centre also contribute to the growth of the research environment in centres like Cameroon and Tanzania where formal Research Centres have not yet been established.

Each AIMS Research Centre develops areas of specialisation in collaboration with local governments, industry and universities, which contribute in building local capacity.

AIMS Research Centres are dynamic environments where both AIMS researchers and visiting scientists thrive, and young scientists find exciting opportunities as they learn to become critical thinkers and future innovators who can contribute to Africa's development. Researchers work in close collaboration with local and global universities/ research institutions to build pan-African and international networks. While research outputs are published widely in scientific journals, AIMS also collaborates with industry partners to drive global relevance and application of their research.

THE AIMS GLOBAL RESEARCH CHAIR PROGRAM

HUMBOLDT FOUNDATION RESEARCH CHAIR

AIMS Sénégal's Endowed Chair in Mathematics and its Applications, **Prof. Mouhamed Fall,** funded by DAAD/Humboldt Foundation, has continued to drive the expansion of the research centre in Sénégal. This is apparent from the number of additional students in his research group, workshops and conferences organised at the centre which provides direct benefits to the larger Senegalese scientific community, participation of his research group in other scientific events hence increasing the visibility of the Centre's activities, hosting researcher visitors at the centre, strengthening partnership with researchers globally through visits which he undertakes to other institutions and supporting research and teaching activities at other AIMS Centres.

Part of his research work driven by his PhD student Mr Kwabena Owusu (AIMS Ghana graduate) is geared at addressing a key food security challenge in Sénégal within the fishery sector. In his research, he is working directly with fishermen in Mbour to collect data and to apply mathematical concepts in game theory to produce research-based evidence that will inform fishery practices and policies in Sénégal.

Prof. Fall was appointed as a Simons Associate at the Abdus Salam International Center for Theoretical Physics. In addition, he was a special session organiser for the 10th American Institute for Mathematical Sciences' Conference in Madrid on Dynamical Systems, Differential Equations and Applications from 7 to 11 July. From October 28 to November 12, he visited the Center for Mathematical Modelling in Santiago, Chile where he worked with Professors Fethi Mahmoudi and Enrico Valdionci on mathematical physics problems. During this reporting period, Prof. Fall has produced seven articles for publication in peer-reviewed journals. The Research centre at AIMS Sénégal has hosted 17 visitors from Germany who participated in scientific events organised at the Centre and also engaged in research discussions with the Chair, and 10 research visitors from outside of Germany (of which five were from institutions in Africa).

Prof. Mouhamed Fall

"PART OF MY RESEARCH WORK, DRIVEN BY MY PHD STUDENT, IS GEARED AT ADDRESSING A KEY FOOD SECURITY CHALLENGE IN SÉNÉGAL WITHIN THE FISHERY SECTOR."

DR SIMUKAI UTETE
SENIOR RESEARCHER, AIMS SOUTH AFRICA

"THE VISION AND IDEAL WOULD BE THAT EVERYONE HAS ACCESS TO MEANINGFUL OPPORTUNITIES TO EXPLORE DIFFERENT SUBJECTS, WITHOUT RESTRICTIONS BASED ON PRE-CONCEIVED ROLES. THIS WOULD BRING A DIVERSITY OF IDEAS AND APPROACHES TO SCIENCE AND TO OTHER FIELDS, TO THE BENEFIT OF INDIVIDUALS AND SOCIETY."

In February 2015, AIMS South Africa welcomed Dr Simukai Utete as Senior Researcher in the AIMS South Africa Research Centre. Dr Simukai Utete's undergraduate degree was in electrical engineering from the University of Zimbabwe. She completed an MSc in Computation and a DPhil in Robotics at the University of Oxford and went on to complete a Junior Research Fellowship and further research there. She moved to South Africa in 2008 to join the Council for Scientific and Industrial Research (CSIR) Mobile Intelligent Autonomous Systems (MIAS) field robotics group and was appointed Research Leader of MIAS in 2009.
She led and managed the group, a team comprising primarily research scientists/ engineers, for over four years.

Dr Utete's research area is robotics, in particular, the development of methods to achieve systems which can operate with high levels of autonomy, for robotics and related applications. This includes the study of problems in data fusion and decision fusion, and intelligent sensor networks, including decentralised sensing systems. One of her related areas of interest is intelligent monitoring – applying techniques for coordination and communication in intelligent sensor networks so that they can be used, for example, in environmental monitoring. She is also interested in the intersection of robotics and condition monitoring, and the application of methods spanning both areas to the development of intelligent systems.

Dr Utete thinks it is important to create more opportunities for scientists everywhere. While every nation has its own science goals, advances in science in one area can create impact in others. To create more opportunities for scientists, female and male, in Africa and outside of Africa, there need to be more opportunities for people to engage with science. Specifically looking at widening female participation in science in Africa, she suggests looking at what has worked well in encouraging more women into science and in retaining women scientists and engineers – including mentoring programs, access to quality education, access to opportunities, a stable foundation at home and access to good health and nutrition for children and so on. The solutions are society- wide.

At the same time, she notes, there are many things that can be done at the level of individuals and organisations – to take just one example, AIMS has been involved in outreach activities to encourage an interest in science for female and male learners. There are many other programs carried out by scientists which aim to widen participation in STEM.

IDRC JOINT CAREER DEVELOPMENT RESEARCH CHAIRS

The IDRC Joint Career Development Research Chairs form a core pillar of the AIMS Research for Africa initiative, supported by IDRC. The objective of Research for Africa is to contribute to Africa's scientific capacity and knowledge exchange by supporting and strengthening AIMS centres as research hubs.

Dr Wilfred Ndifon and **Dr Gaston Mazandu** were appointed as IDRC Development Research Chairs and joined the Research Centre at AIMS Ghana and AIMS South Africa in June 2014. Their presence in AIMS Ghana led to the official launch of the AIMS Ghana Research Centre and supports the expansion of the centre in South Africa. They have recruited a total of eight research students (three PhD and five Master's students, including six women and two men of which seven are AIMS alumni). Six of these students will work with the African Integrated Research Group for Tropical Infectious Disease under the guidance of Dr Mazandu and the remaining two students will work on projects related to computational immunology under the guidance of Dr Ndifon. Their presence at AIMS Ghana and AIMS South Africa contributes to on-going research using mathematical tools to address health-related issues, both locally and internationally. Additionally, the group seeks to apply statistical methods to extend the use of existing drugs beyond their original function. To ensure that Africa takes advantage of these new approaches, the Chairs recognise that a critical mass of scientists able to understand and apply such concepts is required.

To this end, they are supporting the supervision of students in the AIMS Master's program in addition to the researchers in their research groups. AIMS Master's students who have been supervised by the Chairs have been exposed to research projects that explored the use of computational biology techniques to demarcate plant defense response pathways; the application of semantic similarity-based approaches to search for drug therapy against Ebola; the analysis of Ebola Virus Associated Proteins in human proteome/genome for drug target identification; and explaining an experimental method for measuring antibodies. Results of these research projects have the potential to advance policies and practices in agriculture and human health. The students have graduated and are now pursing higher degrees. Specifically, Ms Ephifania Geza, supervised by Dr Mazandu, graduated from AIMS South Africa this year and has recently started her PhD under Dr Mazandu.

Dr Mazandu is collaborating with Dr Emile Chimusa (AIMS Alumni Small Research Grant recipient and lecturer at the University of Cape Town) on a research project entitled "African Integrated Research Group for Tropical Infectious Disease". The objective of the project is to design computational and mathematical models and tools to tackle challenges of infectious diseases in Africa. The project focuses on existing and emerging infectious and neglected tropical diseases, including Ebola, TB and HIV, which thrive mainly among the poorest populations in Africa. The project seeks to build predictive disease models and identify novel mechanisms for disease therapy as a means to contribute to the design of effective control strategies and the implementation of appropriate health surveillance strategies. Dr Mazandu and Dr Chimusa have recruited seven AIMS alumni to work on this project.

The presence of the Chairs at AIMS centres, particularly in Ghana where no research centre previously existed, is playing a significant role in increasing the visibility of the centres through scientific events organised by the Chairs. In addition to hosting events at AIMS South Africa and

Dr Wilfred Ndifon

"WE ARE PASSIONATE ABOUT USING COMPUTATIONAL IMMUNOLOGY AND BIOINFORMATICS TO CHALLENGE CURRENT DRUG/VACCINE DISCOVERY METHODS AND INTRODUCE LOW-COST AND RAPID DRUG/VACCINE DISCOVERY METHODS THAT ARE HIGHLY EFFECTIVE AND TAKE INTO ACCOUNT THE GENETIC VARIATIONS THAT EXIST WITHIN HUMANS."

Dr Gaston Mazandu

Dr Antoine Tambue

"I PLAN TO STRENGTHEN MY INTERACTION WITH INDUSTRY IN THE COMING YEARS TO ENSURE THAT USABLE OUTPUTS IN MY RESEARCH CAN BE TAKEN UP BY THE RELEVANT INDUSTRIES IN AFRICA."

AIMS Ghana, the Chairs have also been invited as presenters and participants at various meetings and conferences around the world:

- **International Society for Computational Biology** and the **African Society for Bioinformatics - Computational Biology Conference on Bioinformatics**, 9 to 11 March, Dar es Salaam, Tanzania. Dr Mazandu gave a presentation on "Optimal search for drug therapy against Ebola Virus Disease."
- **World Health Organization Immunization and Vaccines-related Implementation Research Advisory Committee Meeting**, 8 to 12 June, Geneva, Switzerland. Dr Ndifon participated in the committee meeting as an invited subject expert.

AIMS ARETÉ JUNIOR CHAIRS

The AIMS African Research, Education and Teaching Excellence (ARETÉ) Junior Chairs program provides high-profile and pioneering academic positions to young African scientists with international experience obtained outside Africa to fully integrate within research/academic institutions in Africa. The program, a collaboration between AIMS-NEI and the Robert Bosch Stiftung (Germany), offers an opportunity for African scientists to continue their research work and contribute to Africa's growth through research and teaching. The goal of the AIMS ARETÉ Junior Chairs program is to build a community of motivated and talented scientists who will undertake international-class scientific work on the African continent. It is a key mechanism of promoting brain gain on the continent.

Dr Antoine Tambue, is an AIMS alumnus and the first ARETÉ Junior Chair appointed in July 2014 to AIMS South Africa, he has made significant progress in:

- Establishing his research group, consisting of one Post-doctoral fellow, one PhD and three research Master's students;
- Actively carrying out research projects with his collaborators working with research groups at the University of Marien Ngouabi, Congo and at the University of Bergen in Norway. He has six research papers in progress;
- Supervising four AIMS Master's students during the three month research project of their studies at AIMS;
- Participating at scientific events; and
- Networking between AIMS centres and other institutions within and outside of Africa.

During this period, he attended the 4th African Mathematical School at the University of Douala in Cameroon where he taught the course "Pricing debt and equity in corporate finance". He also attended and gave a talk at the 39th Symposium of Numerical and Applied Mathematics (SANUM) at the University of Pretoria from 30 March to 1 April 2015. He attended the 10th International Conference on Large-Scale Scientific Computations in Sozopol, Bulgaria from 8 to 12 June 2015.

With his expertise in developing mathematical models important for the recovery of energy from sub-thermal reservoirs and his interest in financial mathematics, Dr Tambue is passing on this knowledge to the next generation of African scientists through the students/researchers in his research groups, and through conferences, workshops, teaching and collaboration visits which he is involved in.

The Robert Bosch Stiftung has approved funding for a second ARETÉ Chair whose formal appointment is anticipated in 2016.

DR REJOYCE GAVHI-MOLEFE
POSTDOCTORAL FELLOW, AIMS SOUTH AFRICA

"I AM WORKING WITH TWO COLLABORATORS ON THE DRAFT OF A NEW BOOK TITLED *"STORIES OF YOUNG AFRICAN FEMALE EMERGING SCIENTISTS,"* WHICH IS AIMED AT INSPIRING YOUNG GIRLS AND WOMEN."

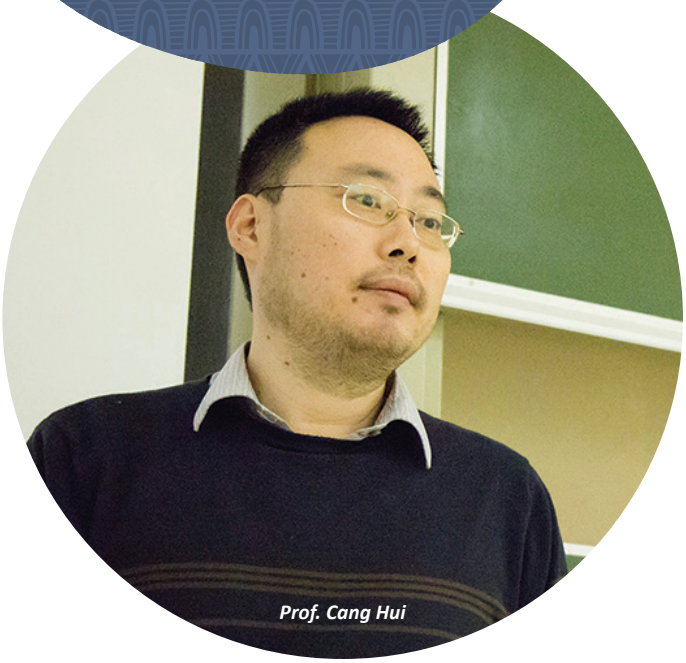
Dr Rejoyce Mpfareleni Gavhi-Molefe wishes to be an inspirational role model for young women with a dream to make a difference. She hails from Khalavha village in the province of Limpopo in South Africa where poverty severely limits access to educational institutions, especially those of higher learning. She obtained a BSc from the University of Venda in 2004; and Hons, Master's and PhD degrees in Mathematics from the University of Stellenbosch, under the supervision of Prof. Johan de Villiers. She went on to pursue Postdoctoral research at the Department of Mathematical Sciences at the University of Alberta, Canada. Her research was on Subdivision; a specific branch of Computational Mathematics with important application areas in animation movie production, medical imaging, aircraft and automobile design.

She is also interested in Mathematics education research and projects that will contribute to the positive growth of disadvantaged communities. Rejoyce was also involved with AIMSSEC as a part-time lecturer to make a difference to the educational opportunities for children and young people in South Africa. She is the founder of MathAfrica - Math for Africa, a non-profit organisation that raises awareness about the need for quality Mathematics and Science in rural African school communities. She is currently an executive member of South African Women in Science and Engineering (SAWISE).

In September/ October 2014, she was one of five South African Women selected to represent South Africa at the USA sponsored 2014 TechWomen program. This program involves the mentoring by leading experts of 70 participants chosen from Africa and Asia during a five-week long period in the San Francisco Bay area, Silicon Valley, as well as in Washington DC. As a direct consequence of her participation, a group of these USA mentors visited AIMS South Africa as her guests in January 2015. During the visit a new mentorship program led by her was established for women students at AIMS South Africa.

Prof. Romeel Davé

THE INCREASE IN THE NUMBER OF RESEARCH CHAIRS AT AIMS IS HELPING TO BUILD RESEARCH CAPACITY FOR THE NEXT GENERATION OF STUDENTS IN CUTTING-EDGE MATHEMATICAL DISCIPLINES.



Prof. Cang Hui

SOUTH AFRICAN RESEARCH CHAIRS

Prof. Romeel Davé is the SARChI Chair in Cosmology with Multi-wavelength Data, a joint national research chair split between AIMS, the University of the Western Cape (UWC), and the South African Astronomical Observatory. Current projects with students and postdocs include studying how to best constrain galaxy evolution models using upcoming radio data with MeerKAT and the SKA, producing the most advanced model for predicting the HI 21cm signal from the Epoch of Reionization, understanding the co-evolution of galaxies and their central supermassive black hole over cosmic history, and further developing his simple yet remarkably successful "equilibrium model" for galaxy evolution. Prof. Davé is involved in the Gizmo project, a revolutionary new code that is the most accurate hydrodynamic solver currently available, and is responsible for developing its cosmological-scale applications. His group will use computing resources at UWC to run the MUFASA simulation suite, which will be the first set of cosmological-scale galaxy formation simulations run with Gizmo.

Prof. Davé also organised an annual focused meeting on a given science topic; this year's meeting was held from 1 to 5 June 2015 near the Kruger National Park, and was titled "Reionization: A Multi-wavelength Approach," drawing over 40 experts from five continents for a week of high-level discussions on this key science topic.

The appointment of **Prof. Cang Hui** as a joint Research Chair between AIMS South Africa and the University of Stellenbosch early in 2014 through the SARChI Initiative marked a further recognition of the important role which AIMS can play in the accomplishment of South Africa's development strategies. One of his research interests driven by his PhD student, Ms Savannah Nuwagaba an AIMS South Africa graduate, takes a closer look into how behaviour of species inform conservation strategies.

"Have you ever wondered why species are organised in such a way that species in one group interact more with each other, than with species in other groups?" Ecologists name this form of self-organisation "compart-mentalisation". In trying to understand how this organisation happens, ecologists noticed that consumer species are constantly selecting and adjusting which resource species they want to exploit. They select highly profitable resources rather than consuming all available resources.

Ms Nuwagaba's study shows that this adaptive behaviour explains the level of compartmentalisation in 61 real predator-prey ecological communities. Amidst the current disturbances which ecological communities are facing as a result of human activities, she anticipates that this adaptive behaviour could rebalance communities back to their equilibrium. "This behaviour allows the abundance of species to fluctuate without necessarily leading to the extinction of some species." She adds that "ignoring species' adaptive behaviour can lead to either an under or overestimation of expectations". She further highlights that species behavioural processes should be closely monitored as they may have important implications for putting into place sustainable conservation strategies."

Read the paper:
Nuwagaba, S. Zhang, F. & Hui, C. (2015) A hybrid behavioural rule of adaptation and drift explains the emergent architecture of antagonistic networks. Proceedings of the Royal Society B: Biological Sciences, 282: 20150320.

HELPING HUMANITY TO GET A BETTER UNDERSTANDING OF THE UNIVERSE

MS AMEL SHAMSELDEEN ALI ALHASSAN (SUDAN), AIMS 2013
AIMS SMALL RESEARCH GRANT RECIPIENT

Ms Amel Shamseldeen Ali Alhassan from Sudan, graduated from AIMS Ghana in 2013. She currently has a full-time position as a lecturer at a private college in Sudan and has recently gone on a research visit to the German Electron Synchrotron (DESY) where she worked in close contact with a transition edge sensor for single photon detection.

Ms Alhassan has always liked mathematics and even as a little child it seemed to suit her personality. Her family, teachers and lecturers were all very supportive. "I chose to study mathematical sciences because I love math and physics and they make sense to me more than any other subject."

"AIMS has helped me achieve my goals as it was through my time at AIMS that I was introduced by one of my lecturers to the group that I am working with. The research I am currently doing is also funded by the AIMS Alumni Small Research Grant. So AIMS has equipped me with an excellent network to help me on my path towards the goals I wish to achieve."

"AIMS' STRATEGY OF HAVING AT LEAST ONE-THIRD OF THE STUDENTS AS WOMEN WORKS AS IT ENCOURAGES MORE WOMEN TO APPLY AS THEY KNOW THERE WILL BE OTHER WOMEN WHO HAVE ALSO APPLIED AND THIS KEEPS THE CIRCLE GOING."

"As a lecturer, I am teaching young medical sciences students physics and mathematics to help them understand their specialisations in a deeper and hopefully better way. While the science project I am working on currently is part of a dark matter endeavour experiment which might help humanity to get a better understanding of the universe."

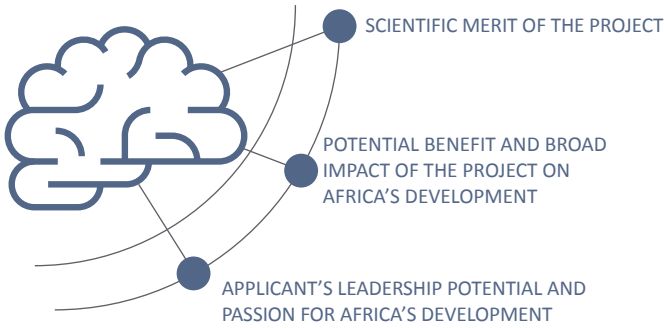
She notes that during her undergraduate studies women were in the majority in the physics department, but the situation dramatically changed at the Master's level. As a faculty member now, the situation is even worse as she is the only full-time woman working in the physics department at the college where she works.

She added, "AIMS is doing very good work in promoting higher studies among women in mathematical science fields in Africa."

AIMS ALUMNI SMALL RESEARCH GRANTS

Many AIMS students and alumni express an interest in conducting research and advancing their research careers. Additionally, some senior AIMS alumni are interested in supervision or co-supervision of students in various institutions but lack sufficient funds to support the realisation of research projects and to further their careers. Through the Canadian IDRC, funds have been secured for AIMS alumni interested or involved in interdisciplinary mathematical science research and its applications, including industry research internships.

ALL AWARDS ARE HIGHLY COMPETITIVE AND FUNDING DECISIONS ARE BASED ON:



The second call for proposals for the AIMS Alumni Small Research Grants opened on 1 August 2014 and closed on 31 January 2015. A total of 11 proposals were received of which five were selected.

The third call for proposals opened on 1 February 2015 and closed on 31 July 2015 for consideration by the review panel in August 2015. The fourth call for proposals opened on 1 August 2015 and closed on 31 January 2016.

DR CHIMUSA'S RESEARCH FINDINGS COULD BE OF CRITICAL IMPORTANCE TO THE HEALTH SECTOR AND DRUG DISCOVERY PROGRAMS.

AIMS received a progress report from Dr Emile Rugamika Chimusa, one of the first recipients of the AIMS Alumni Small Research Grant and currently a lecturer at UCT.

Dr Chimusa and his team have designed modelling tools such as "ancMETA" and "FractalSIM". These tools are important in pinpointing ethnic differences that place a given population at risk to a particular disease by assessing genomic mutations in humans that could make them susceptible to a particular disease. They are currently applying the "ancMETA" on real data of bipolar and schizophrenia from 13 and 8 European populations, respectively. They aim to apply the "FractalSIM" tool to investigate a model for predicting the risk of acquiring a given complex disease.

Dr Chimusa's research findings could be of critical importance to the health sector and drug discovery programs. He is currently preparing a series of publications to disseminate the team's research findings.

AIMS ALUMNI SMALL RESEARCH GRANT RECIPIENTS	
NAME	**AFFILIATION**
Ms Amel Shamseldeen Ali Alhassan	German Electron Synchrotron (DESY), Hamburg, Germany
Mr Alex Bamunoba	Department of Mathematics, University of Stellenbosch, South Africa
Ms Diagne Mbouye Khady	Cheikh Anta Diop University, Dakar, Sénégal
Mr Moussa Thiam	University of Ottawa, Canada
Ms Perpetual Saah Andam	Department of Mathematics, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

WORKSHOPS ORGANISED BY AIMS CENTRES

Centres host a number of relevant workshops and conferences for students, researchers and other members of the scientific community. These events focus on raising awareness of the applications of mathematical science, provide networking opportunities for students and alumni, and support the growth of the local academic environment.

12th Mathematics in Industry Study Group Workshop


AIMS South Africa-Stellenbosch University Number Theory Workshop


Medical population genetics and Genome-Wide Association (GWAS) for complex diseases workshop

8th Summer School in Mathematical Finance


Mathematical Sciences for understanding real world problems in Africa workshop


Annual Clinic on the Meaningful Modelling of Epidemiological Data

The following workshops, seminars and conferences took place:

- The Cosmology Group at AIMS South Africa jointly organised the first ever **Namibian JEDI workshop** in Windhoek 30 June to 6 July 2014; the **2nd Machine Learning JEDI Worksho**p at AIMS South Africa from 20 to 24 October 2014; and a **Big Data and Machine Learning JEDI** at the University of Mauritius from 12 to 15 January 2015.
- AIMS South Africa hosted the **Explore the Financial Markets with Maths Student Workshop** from 24 to 28 November 2014.
- From 5 to 7 November 2014, the **AIMS-IMAGINARY / Maths Communication in Africa workshop** organised by AIMS-NEI, IMAGINARY and the Mathematisches Forschungsinstitut Oberwolfach was held at AIMS South Africa.
- The **12th Mathematics in Industry Study Group Workshop**, co-hosted by AIMS South Africa and the University of the Witwatersrand was held at AIMS South Africa from 12 to 16 January 2015.
- The **AIMS South Africa-Stellenbosch University Number Theory Workshop** at AIMS South Africa from 19 to 23 January 2015.
- The **Applied mathematics and software development seminar** co-organised by AIMS Cameroon, the University of Applied Science in Giessen and the University of Applied Sciences in Fulda, was held from 18 to 20 February 2015.
- The **8th Summer School in Mathematical Finance** was at AIMS South Africa from 19 to 21 February 2015.
- The **Spring School on Variational and Geometric Methods in Nonlinear Partial Differential Equations**, jointly organised by AIMS Sénégal and the Goethe University Frankfurt, through financial support from the German Academic Exchange Service (DAAD) was held from 15 to 20 February 2015.
- The **3rd International Workshop on Nonlinear and Modern Mathematical Physics**, co-organised by AIMS South Africa, the University of South Florida and North West University was held from 9 to 11 April 2015.
- The school **Continuum Methods for Discrete Problems in Combinatorics, Optimization and Mathematical Physics** was hosted by AIMS Sénégal from 13 to 17 April 2015.
- The **1st Annual African Symposium on Genome-Wide Association Studies (GWAS)** for Complex Disease, 23 to 24 April was held at AIMS South Africa. Prior to the symposium, a **Workshop on Medical and Population Genetics and Genome-Wide Association Studies (GWAS) for Complex Diseases** was held from 20 to 22 April 2015.
- AIMS Ghana hosted the **Computing in Applied Mathematical Sciences Workshop** from 29 June to 10 July 2015. The workshop was co-organised by Dr Ndifon and partners from the American Office of Naval Research, Global Division, University of Florida and the University of Texas at Austin.
- The **17th Africa Regional Workshop on Modelling, Simulation and Optimisation**, organised by AIMS Ghana with financial support from the Government of Ghana was held at the University of the Cape Coast from 4 to 8 May 2015.
- The **Mathematical sciences for understanding real world problems in Africa workshop**, a joint AIMS Sénégal-Georgia Tech initiative was held at AIMS Sénégal from 18 to 21 May 2015.
- The **6th Annual Clinic on the Meaningful Modelling of Epidemiological Data**, co-hosted by the South African Centre for Epidemiological Modelling was held at AIMS South Africa on 1 to 12 June 2015.

RESEARCH OUTPUTS

AIMS PUBLICATIONS PER YEAR (NON-CUMULATIVE)

The figure alongside illustrates growth from 2010 until 2014. During this period the output has grown with an average factor of 1.8 per year. Between 20% and 30% of the scientific output is from visiting researchers.

Of the papers, 90% are articles published in journals; the other 10% include conference papers, articles in press, notes and reviews. The three main subject areas of papers are Physics and Astronomy (34%), Earth and Planetary Sciences (21%) and Mathematics (16%).

CITATIONS

As the output of papers by AIMS has been rising, so has the cumulative number of citations AIMS papers have received (1624 on 30 June 2015). The indicator of interest though is the average number of citations per paper, which is 7 citations per paper. Another key indicator is the h-index, which is 19. This indicates that AIMS researchers have published 19 documents that have been cited at least 19 times.

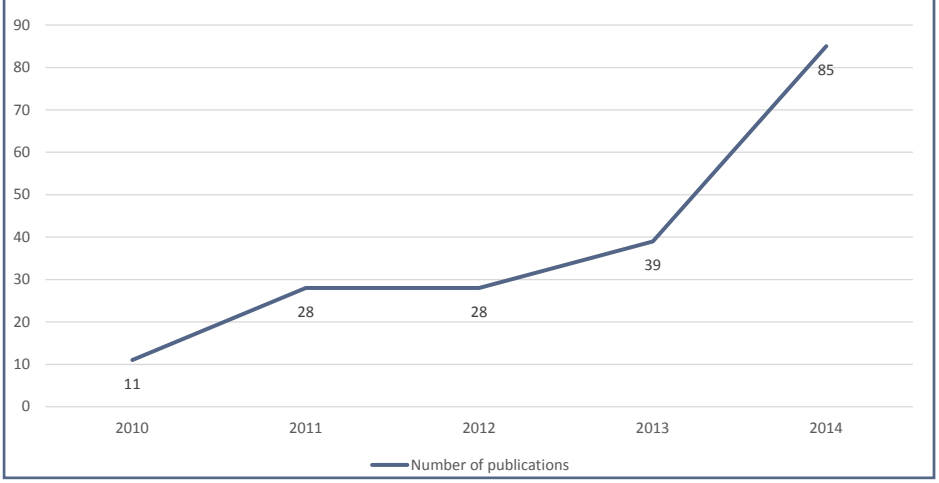
JOURNALS

AIMS researchers mostly publish in journals with an above average impact factor.
The Source Normalized Impact per Paper (SNIP) is a comparative indicator of the impact of journals. SNIP is the ratio of a source's average citation count per paper and the citation potential of its subject field. A SNIP value that is higher than one means that the journal has an above average SNIP for its field. A SNIP that is lower than one means that the journal has a below average SNIP for its field. If SNIP is equal to 1, the journal is absolutely average for its field. AIMS has published 111 papers in these journals which constitutes 47% of all publications.

TOP CO-PUBLICATION INSTITUTIONS

In addition to the top 10 institutes AIMS co-publishes with, AIMS works together with many African institutes as well.
The top 5 African institutes in terms of co-publications are all South African institutes. The only other African institute that is not in South Africa that AIMS co-published with frequently (17 papers) is Université de Yaoundé I in Cameroon.

AIMS OCCUPIED 9TH PLACE IN AFRICA FOR WEIGHTED RESEARCH OUTPUTS ON THE NATURE INDEX LIST AND WAS 16 OUT OF 50 TOP RESEARCH CENTRES IN AFRICA, ACCORDING TO THE CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS, THE PRINCIPAL RESEARCH ORGANISATION IN SPAIN.



IMPACT FACTORS FOR THE TOP 5 JOURNALS WITH MOST AIMS PUBLICATIONS

JOURNAL	NUMBER OF PUBLICATIONS	SNIP 2004-2014	SNIP 2014
Astronomy and Astrophysics	50	1.22	0.95
Astrophysical Journal	17	1.53	1.19
Journal of Cosmology and Astro particles Physics	15	0.88	1.19
Physical Review D – Particles, Fields, Gravitation and Cosmology	15	1.36	1.16
Monthly Notices of the Royal Astronomical Society	14	1.35	1.33

TOP 10 ALUMNI RESEARCHERS (According to their h-index and number of citations.)

NAME	AFFILIATION	PUBLICATIONS	CITATIONS	h-INDEX
Osalusi, Emmanuel	Heriot-Watt University, International Centre for Island Technology, Edinburgh, UK	12	169	8
Abdussalam Shehu Shuaibu	Abdus Salam International Centre for Theoretical Physics, Trieste, Italy	12	285	7
Ndeffo Martial Loth Mbah	Yale University, Center for Infectious Disease Modeling and Analysis, New Haven, US	20	99	7
Mazandu, Gaston Kuzamunu	AIMS South Africa	17	82	6
Mabiala, Justin	Cyclotron Institute, College Station, US	29	72	6
Okeke, Onyekwelu Uzodinma	Harvard University, Department of Physics, Cambridge, US	6	93	4
Hamdouni Yamen	N/A	10	92	4
Johnstone-Robertson, Simon Peter	University of Melbourne, Parkville, Australia	6	85	4
Akofor, Earnest	Syracuse University, Department of Electrical Engineering and Computer Science, US	9	79	4
Worku, Dawit Solomon	UCT-CERN Research, Centre and Department of Physics, South Africa	4	71	4

Source: Technopolis 2015, Scopus

PUBLIC ENGAGEMENT

AIMS Centres are increasingly reaching out and engaging with a variety of audiences at the country level through seminars, lectures, and outreach to high school and universities. This has helped to generate interest and enthusiasm in STEM and raise awareness on the role AIMS Centres play in developing young African scientists. The activities are designed to build the local capacity of teachers to teach science and mathematics, to raise public awareness of the value of sciences and mathematics, and to increase interest in AIMS. These activities are key in creating sustainable local demand for science and mathematics graduates, in building the pipeline of future AIMS students, and are utilized in facilitating local, national and international partnerships.

MATHEMATICS TEACHER TRAINING

The AIMS Schools Enrichment Centre (AIMSSEC), Mathematics Teacher Training in Cameroon and workshops at other centres.

COMMUNITY ENGAGEMENT

Engaging with a variety of audiences at country level through seminars, lectures, and outreach to high school and universities.

ALUMNI ENGAGEMENT

AIMS alumni are an invaluable resource to AIMS advancement efforts.

GLOBAL ENGAGEMENT

AIMS is increasingly invited to participate in global discussions on STEM with key stakeholders.

PARTNERSHIP DEVELOPMENT

AIMS is committed to building tailored and mutually beneficial partnerships.

THE NEXT EINSTEIN FORUM

is an AIMS initiative in partnership with Robert Bosch Stiftung and is focused on convening Africa's innovators to highlight breakthrough discoveries and catalyse scientific collaboration for human development.

MATHEMATICS TEACHER TRAINING

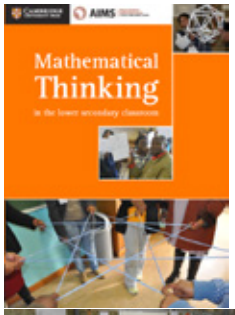
THE AIMS SCHOOLS ENRICHMENT CENTRE (AIMSSEC)

24 MATHEMATICAL THINKING COURSES HAVE BEEN RUN OVER 12 YEARS, AND COLLECTIVELY REACHED A TOTAL OF 1,340 TEACHERS ACROSS SOUTH AFRICA.

AIMSSEC continues to provide continuous professional development opportunities for previously disadvantaged rural South African teachers. Opportunities are designed to cover gaps in content knowledge and pedagogical skills in order to improve the quality of teaching and learning of mathematics.

Activities for the period included:

- In January 2015 AIMSSEC participated in the **SAARMSTE Conference** held in Maputo to present the work being done on the FaSMed toolkit.
- At regional level, AIMSSEC presented a workshop titled 'Improving the quality of teaching and learning mathematics in schools' at the AMUCWMA / AWMA (African Women in Mathematics Association) in Kenya in July 2015 under the theme of "Women in Mathematics for Social Change and Sustainable Livelihoods ".



- Dr Barrie Barnard, Academic Manager, AIMSSEC, participated in the official launch of the **AIMS Mathematics Teacher Training Program** funded by the MasterCard Foundation held in March 2015, in Yaoundé, Cameroon.
- In May 2015, 60 teachers (including 41 women) graduated from the **Advanced Certificate in Education (ACE)** delivered in partnership with the University of Fort Hare.
- AIMSSEC also attended and contributed four presentations at the **21st Annual National Congress of the Association for Mathematics Education** in South Africa which was held from the 29 June to 3 July 2015.
- The **Mathematical Thinking Short Course** is now endorsed by the South African Council for Educators (SACE) to be offered to in-service teachers. Two alumni returned as lecturers on the MT24 course held in July 2015 and six alumni returned as teaching assistants.
- Between April and August 2015 AIMSSEC partnered with Deloitte South Africa to provide teacher training courses for the **National Education Collaboration Trust (NECT)** in two poor performing districts in Limpopo Province namely Waterberg and Vhembe districts.
- AIMSSEC's research department continues to engage with teachers and learners in developing a toolkit based on formative assessment. AIMSSEC's research on the European Union funded project **FaSMEd (Formative Assessment in Science and Mathematics Education)** began in January 2014 and will end at the end of 2016. The compilation of chapters for a book series, developed by local AIMSSEC staff and a team of international volunteers, aimed at supporting teachers in developing countries. The first book in the series **"Mathematical Thinking in the lower secondary classroom"** will be published by Cambridge University Press by March 2016.

Learner activity on the MT course

Women in Mathematics for Social Change and Sustainable Livelihoods

MT24 Course held in July 2015

FROM STUDENT TO LECTURER, HELPING TO TRANSFORM MATHEMATICS TEACHERS IN SOUTH AFRICA

MS SAGREE PILLAY, IP TEACHER, EASTERN CAPE, SOUTH AFRICA

"IT HAS ALWAYS BEEN MY PASSION TO BE INVOLVED WITH TEACHER TRAINING AS I FEEL THAT TEACHERS NEED TO LEARN AND TEACH MORE THAN JUST CONTENT ALONE."

Ms Pillay started her journey with AIMSSEC in 2009 when she attended the Mathematical Thinking (MT) 11 residential course. "The 10 days changed my outlook, teaching approach and opened my eyes to many new experiences. I returned home, a new teacher, one who turned mathematics lessons into joyful learning sessions."

The residential course is followed by a three-month distance learning course. Putting all those new skills and approaches into practise and evaluating and reflecting upon their efficacy proved to be a valuable didactic experience. Tutors gave her helpful and critical feedback, which meant that she was able to develop as a teacher. This encouraged her to enrol for the ACE in Mathematics from which she graduated Cum Laude at the end of 2011.

In 2012 and 2013 she joined the AIMSSEC team as a tutor on the MT courses. "From this position, I was able to observe how the best, experienced and highly qualified tutors went about their duties."

In 2013, Ms Pillay was invited by AIMSSEC to give a talk at the AIMS 10th Anniversary Graduation Ceremony.

"It has always been my passion to be involved with teacher training as I feel that teachers need to learn and teach more than just content alone. They need to teach hope and bring joy to the classroom. That comes with confidence and genuine self-enjoyment. So, it was a dream-come-true when AIMSSEC invited me to attend the 2014 and 2015 winter courses as a lecturer."

MATHEMATICS TEACHER TRAINING IN CAMEROON

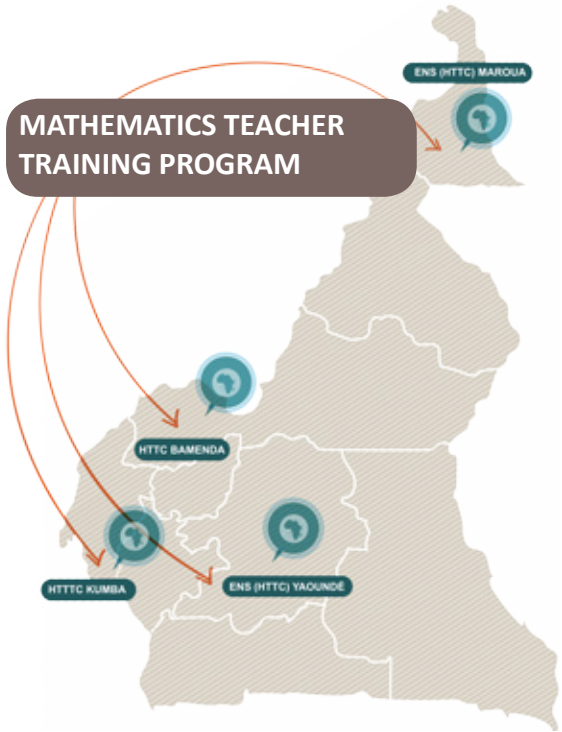
The Mathematics Teacher Training (MTT) program at AIMS Cameroon is a five-year pilot program in partnership with The MasterCard Foundation, AIMS, ADEA and the government of Cameroon to improve the quality of secondary schools maths education by training maths teachers, inspectors, experienced teachers as master trainers who will in turn train secondary school math teachers. This is intended to strengthen the content and delivery of mathematics at the secondary level across Cameroon, which will contribute to build and strengthen the pipeline of students continuing into STEM fields at the tertiary level.

This pilot program, set to start in January 2016, will increase the transition rates between educational levels in science and mathematics – especially for girls, and contribute significantly to Africa gaining its rightful place in the global knowledge economy and securing its economic future. It is a project which will ensure that:

- All the math lecturers at the three Higher Teacher Training Colleges (HTTCs) and University of Buea, some inspectors and experienced teachers will be provided with Math knowledge, skills and confidence to effectively carry out pre-service and in-service training of math teachers in Cameroon who are ultimately responsible for over 1.7 million secondary school students across Cameroon.
- All the math pedagogic inspectors will be given sound knowledge on new supervising skills, while principals will receive new methods of managing math teachers with new skills and teaching methods.
- All participants will be trained in gender responsive pedagogy to ensure that they have the skills and knowledge required to effectively engage and encourage girls to pursue STEM education.

The official launch took place on 23 March 2015 in Yaoundé, Cameroon. Officials from the Ministries of Higher and Secondary education and the HTTCs of Cameroon, inspectors and resource staff from the academic and scientific community and AIMS network staff attended. The launch was followed by a planning workshop.

THE PILOT PROGRAM WILL TRAIN 50 MASTER TRAINERS, 1,920, PRE-SEVICE AND 1,200 IN-SERVICE TEACHERS, REACHING 1,700,000 SCHOOL CHILDREN



Teacher Training Planning meeting held in Cameroon in March 2015.

TEACHER WORKSHOPS AT OTHER CENTRES

During the reporting period, AIMS Ghana organised the following workshops for math teachers:

- A **workshop for senior high school math teachers** in the Central Region from 7 to 11 July 2014. Led by Prof. Eric Hamilton from Pepperdine University (USA), and facilitated by Mr Zachariah Mbasu from the Makhoho Secondary School, Kenya. 21 participants, including 8 women, were introduced to the use of technology, such as mathematical software, GeoGebra, and media as teaching tools.
- From 25 to 29 May 2015, AIMS Ghana organised a **Mathematics Teacher Training Workshop** in Donkorkrom, Ghana. A total of 46 teachers from 24 schools in the Kwahu North District of Ghana participated in the workshop. Topics addressed included fractions, word problems in maths, factorisation and linear equations. Participants were awarded certificates of completion by AIMS Ghana at the end of the training workshop.
- From 4 to 8 August 2014, AIMS Sénégal, in conjunction with the Faculté des Sciences et Technologies de l'Education et de la Formation (FASTEF), provided a **teacher training workshop**. Attended by 24 secondary school teachers, including two women, from 12 secondary schools in Mbour, the workshop was aimed at training the participants in new ways of teaching mathematics in the classroom. After the workshop, participants proposed that similar training sessions should be facilitated for other teachers in the future.

COMMUNITY ENGAGEMENT

EVENTS, EXHIBITIONS AND PUBLIC LECTURES

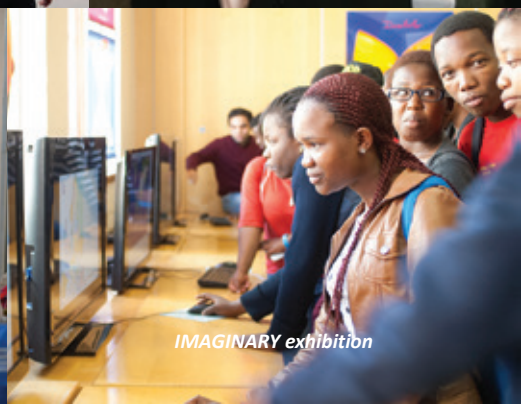

IMAGINARY Workshop attenddees

From 4 to 7 November 2014, AIMS hosted the **IMAGINARY Exhibition-Workshop** at AIMS South Africa. The exhibition was visited by around 370 people, consisting of school and university students, teachers, researchers and the general public. A **Science Slam** event titled "From the Big Bang to the Brain" took place on Friday 7 November. The goal of the workshop was to showcase interactive mathematics learning tools, to work on dedicated activities for Africa, and to jointly plan future activities.

'Pi-Day'celebrations


Scifest 2015


Prof. Cedric Villani


IMAGINARY exhibition

AIMS Ghana continued its outreach efforts to local universities offering STEM related programs with the aim of generating an interest among students to pursue further studies in mathematical sciences.

- AIMS Ghana visited the **University of Lomé**.
- AIMS Ghana students, tutors and lecturers visited **Biriwa Basic School** (primary and junior high school level) to teach students in mathematical sciences and encourage further study in the field.
- AIMS Ghana also embarked on **outreach visits to universities in Ghana, Burkina Faso and Benin** to introduce students and faculty to the AIMS model and raise interest in pursuing mathematical sciences as a career.
- On 18 October 2015, AIMS Ghana took part in the **Biriwa Annual Festival**.

AIMS Cameroon activities:

- Students participated in the **Youth Day Celebration** in Limbe, Cameroon on 11 February.
- On 15 to 18 June 2015, AIMS Cameroon tutors provided **Computer software training** in MS Office for 18 civil servants from Fako Division, Cameroon.
- The **AIMS Cameroon Open Day**, on 22 June, helped to raise public awareness of AIMS, targeting students and teachers in mathematical sciences at AIMS Cameroon. Prof. Robert Nzengwa, Dean of the Faculty of Industrial Engineering, gave a lecture on Mathematics for Engineering.
- **Mathematics Olympiads**, co-organised with the University of Buea Students Association, for students from AIMS Cameroon and the university took place on 23 May 2015.

On 14 March 2015, AIMS Tanzania together with the Mathematics Association of Tanzania organised the annual **'Pi-Day'** celebrations at a city centre showground in Dar Es Salaam where AIMS Tanzania students were joined by several hundred school children.

AIMS South Africa participated in a number of exhibitions during the reporting period. Staff and researchers hosted exhibition stands or gave talks at the following events:

- Dr Rejoyce Gavhi-Molefe gave a keynote address titled, **"Embarking on a PhD"** at the National Research Foundation's (NRF) SA PhD Project Conference 2014 held in Mahikeng, North West Province on 14 September 2014.
- Prof. Green represented AIMS at the **Mathematics in Emerging Nations: Achievements and Opportunities Conference** (MENAO) held in Seoul, Korea on 12 August 2014.
- AIMS staff hosted stalls at **SciFest Africa** (Grahamstown, March 2015), the **African Young Graduates and Scholars Conference** (UCT, 30 March to 2 April 2015), the **NRF SA PhD Regional Conference** (Somerset West, 30 March 2015) and the **Career Fair** of the Department of Mathematical Statistics and Actuarial Science (University of the Free State, 25 April 2015).

At AIMS Cameroon there were seven public lectures including four by Prof. Cedric Villani, Lyon University (Fields Medalist and Co-Chair of the AIMS Academic and Scientific Advisory Council). Prof. Villani also gave a public lecture at AIMS Sénégal.

AIMS Ghana also hosted a public lecture by Prof. Fritz Hahne (Stellenbosch University and a member of the AIMS South Africa Trust).

There were nine public lectures hosted at AIMS South Africa.

ALUMNI ENGAGEMENT

AIMS alumni are an invaluable resource to AIMS advancement efforts. They provide the faces, voices and stories necessary to demonstrate the impact and the importance of AIMS. AIMS interacts with its alumni and supports them through initiatives such as professional development and career opportunities and training. In addition, the AIMS Alumni Association, which will be run by AIMS alumni and act to provide them support in their endeavours, continues to take shape. A Steering Committee has been formed and a constitution developed, outlining the governance of the association.

In the last quarter of this reporting period, the Student Affairs and Alumni Engagement role was introduced with Ms Irene Tamajong taking on additional responsibilities as Head of Alumni Engagement for the network.

There is increasing interest from AIMS students and alumni to support AIMS at various events, whether hosted by the Global Secretariat, AIMS Centres, or other public events to which AIMS has been invited to participate.

Canadian visit on 12 February 2015

The MasterCard Foundation visit on 2 December 2015

EVENT	DATE	LOCATION	ALUMNI
Parliament Hill Event, to celebrate and raise awareness of AIMS achievements, especially through its partnership with the Government of Canada	1 October 2014	Canada	Mr Solomon Owerre, Mr Keita Sana, Mr Huygens Ravelomanana, Mr Clemonell LB Bilayi, Ms Aminata Dite Tanti Keita, Mr Moussa Thiam, Mr Poclaire Kenmogne, Mr Herve'Dimy Anguima Ibondzi, Mr Mike Nelson, Ms Marvellous Onuma-Kalu, Ms Nosiphiwo Zwane, Mr Mohamad Shalaby, Mr Ezike Ikenna, Mr Dessalegn Melesse
The MasterCard Foundation and Canadian High Commissioner visit to South Africa to the Secretariat and AIMS South Africa	2 December 2014	South Africa	Dr Gaston Mazandu, Dr Antoine Tambue, Ms Armeline Dembo Mafuta, Ms Justine Nasejje, Mr Phathutshedzo Netshabumu, Dr Emile Chimusa Rugamika, Mr Wole Solana, Ms Mpeli Alice Takane, Ms Savannah Nuwagaba
Meeting at the University of Chicago	6 February 2015	United States	Ms Nosiphiwo Zwane and Dr Martial Ndeffo Mbah
Canada's Department of Foreign Affairs, International Trade and Development (DFATD) and Canadian High Commissioners of South Africa and Mozambique visit the AIMS-NEI Secretariat	12 February 2015	South Africa	Dr Gaston Mazandu, Dr Antoine Tambue, Ms Chika Yinka-Banjo, Dr Thifhelimbilu Daphney Bucher, Dr Siaka Lougue, Ms Sylvie Djiomba, Dr Emile Chimusa Rugamika, Ms Justine Nasejje, Mr Wole Solana, Ms Mpeli Alice Takane, Ms Savannah Nuwagaba, Ms Eva Liliane Ujeneza
4th Joint British and Applied Mathematics Colloquium	30 March - 2 April 2015	United Kingdom	Ms Doaa El-Sakout
Michigan State University - partnership signing ceremony	25 April 2015	United States	Ms Nosiphiwo Zwane
IDRC visit to the AIMS-NEI Secretariat and AIMS South Africa	27 April 2015	South Africa	Dr Gaston Mazandu, Dr Antoine Tambue, and Dr Tendai Mugwagwa
Gender Summit 5 Africa	28 - 30 April 2015	South Africa	Ms Savannah Nuwagaba, Ms Justine Nasejje, Ms Mpeli Takane, Ms Armeline Dembo Mafuta, Ms Linsay Blows, Ms Eva Liliane Ujeneza, Ms Sylvie Djiomba Njankou, Mr Ssekajja Samuel Buwaga, Ms Winnie Nakiyingi, and Ms Nancy Achieng Odhiambo. Dr Tendai Mugwagwa and Mr Wole Solana were invited to speak on the "Youth Engagement in STEM" panel.
African Heads of Mission Monthly Meeting	12 May 2015	United Kingdom	Mr Lijoka Oluwaseun Francis (2014) and Mr Ahmed Eltayeb Elbushra
The MasterCard Foundation 2015 Tertiary Scholars Convening: Transformative Leadership	19 - 21 June 2015	United States	Mr Trust Chibawara
65th Lindau Nobel Laureate Meeting	28 June - 3 July 2015	Germany	Mr Didam Gwazah Adams, Ms Juliet Nakakawa, Mr Prosper Ngabonziza, Mr Seth Asante Kurankyi, Ms Savannah Nuwagaba, Dr Thifhelimbilu Daphney Bucher and Ms Nadine Tchamba Yimga

GLOBAL ENGAGEMENT

AIMS is increasingly being invited to participate in global discussions on STEM with key stakeholders. The following events were attended by AIMS during this reporting period:

From 22 to 23 July 2014, AIMS attended the **3rd Ministerial Conference of the Inter-Country Quality Node on Technical and Vocational Skills Development (ICQN/TVSD)** in Abidjan, Côte D'Ivoire.

From 4 to 8 August 2014, the **US-African Leaders Summit** was held in Washington DC. As side events to this summit, three STEM-related symposiums were held. Prof. Francis Allotey, President of AIMS Ghana was invited to attend these symposiums by Dr William Colglazier, the Science and Technology Advisor to the US Secretary of State.

From 15 to 18 September 2014, AIMS representatives attended the inaugural **Canada-Africa Business Summit** in Toronto, Canada.

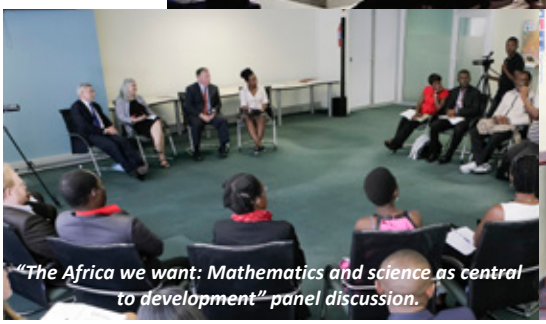
From 16 to 18 September 2014, Ms Mireille Massouka, attended the I**nternational Youth Forum on Peace, Security and Development in the Africa** Sahel Region.

On 30 September 2014, the Constituency for Africa and the World Bank's Africa Region Office hosted a town hall meeting entitled **"Strengthening US-Africa Multilateral Co-operation in the Promotion of the Development of Science, Technology, Engineering and Mathematics in Africa."** Held in Washington, DC, Dr Dorothy Nyambi, AIMS Executive Vice President took part on a panel entitled: "**A Decade of Development: STEM Research in Sub-Sahara Africa."**

From 14 to 17 October 2014, an AIMS delegation attended the **2nd Ministerial Forum on Science, Technology and Innovation in Africa** in Rabat, Morocco.

On 18 October 2014, the inaugural **Rebranding Africa Forum** was held to bring together African leaders and innovators in discussion to change the image and assumptions of Africa. Held in Brussels, Belgium, Mr Zomahoun participated on a panel addressing the challenges of youth employment.

Falling Walls Conference



"The Africa we want: Mathematics and science as central to development" panel discussion.

IDRC visit to AIMS South Africa

From 8 to 10 November 2014, the **Falling Walls Conference** was held in Berlin, Germany. Mr Zomahoun provided a presentation that discussed how capacity building in mathematics lays the foundation for scientific achievement in Africa.

From 29 to 30 November 2014, AIMS President & CEO, Thierry Zomahoun joined Canadian Prime Minister Stephen Harper's delegation to the **Francophone Summit** in Dakar, Sénégal.

On 5 February 2015, Mr Zomahoun participated in a Live Google Hangout titled **"Africa – Home of the Next Einstein?"** together with IDRC President Jean Lebel as part of International Development Week.

From 8 to 11 February 2015, the Government of Canada invited AIMS to join them in attending the **Mining Indaba** in Cape Town, South Africa. This provided AIMS with the opportunity to explore the application of STEM in the mining sector.

On 12 February 2015, Canada's Department of Foreign Affairs, International Trade and Development (DFATD), represented by Patricia Malikail, Director General, Africa Bureau, paid its first visit to AIMS, accompanied by H.E. Gaston Barban, Canadian High Commissioner to South Africa and H.E. Shawn Barber, Canadian High Commissioner to Mozambique. The delegation participated in a panel discussion with AIMS Alumni, AIMS Research Chairs, and AIMS South Africa research staff on **"The Africa we want: Mathematics and science as central to development"** moderated by AIMS alumni Ms Savannah Nuwagaba. From 10 to 12 March 2015, Prof. Barry Green, AIMS Chief Academic and Research Officer, was a panellist speaker on the plenary session **"Science, Technology and Innovation"** at the African Higher Education Summit in Dakar, Sénégal.

On 12 March 2015, Ms Irene Tamajong, Director of AIMS-NEI United Kingdom, represented AIMS in a panel discussion on "**Empowering Youth, Cultural Heritage, Values and Ethics"** at a one-day conference at Carleton University, Ottawa on the African Union's Agenda 2063: Assessing the Development Vision for Africa.

On 13 March 2015, Mr Zomahoun met with H. E. Dr Martial De-Paul Ikounga, African Union Commissioner for Human Resources, Science and Technology in Dakar, Sénégal to discuss the details of the MoU between AIMS and the African Union, which was later signed on 30 June 2015 in Addis Ababa, Ethiopia.

From 27 April to May 4, Ms Ann Weston (Director, Special Initiatives, Program & Partnerships Branch) and Ms Pelagie Lefebvre (Program Management Officer, Science and Innovation) from IDRC joined AIMS at the Gender Summit 5 Africa 2015; met with students and researchers at AIMS South Africa; and held a working session at the AIMS-NEI Global Secretariat with staff.

During the week of 11 May 2015, Mr Zomahoun and Prof. Neil Turok, held strategic meetings with the President of Rwanda and the Minister of Education.

Minister of Finance, COO of the Rwanda Development Board, and key university partners in Kigali, Rwanda. They discussed the partnership between the Government of Rwanda and AIMS and the establishment of an AIMS Rwanda Centre as well as the relocation of the AIMS-NEI Global Secretariat to Kigali.

On 11 May 2015, H.E. Gaston Barban, with support from IDRC, hosted a lunch reception at his residence in Pretoria, South Africa, to build on the relationships established at the Mining Indaba in February.

From 13 to 14 May 2015, Mr Naser Faruqui and Mr Mark Heerden met with senior representatives at IBM, Future Talent, Barclays Africa, Standard Bank, and Holland Insurance Group in Johannesburg, South Africa to discuss potential internship opportunities for AIMS alumni.

On 13 May 2015, Mr Zomahoun was the keynote speaker at **"STEM Education: The key to an emerging Africa"** an event hosted by Kigali Shapers at Carnegie Mellon University in Kigali, Rwanda.

From 18 to 20 May 2015, Mr Zomahoun gave a plenary presentation entitled **"Africa and AIMS: Bridging the Skills Gap in STEM"** at the International Symposium on Innovation and Technology in the Phosphate Industry (SYMPHOS) in Marrakech, Morocco.

From 20 to 22 May 2015, Mr Zomahoun participated in a plenary debate entitled **"This House believes that Africa needs vocational training more than academic education"** at eLearning Africa 2015, the 10th International Conference on ICT for Development, Education and Training, in Addis Ababa, Ethiopia.

From 25 to 29 May 2015, Mr Zomahoun attended the **African Development Bank Annual Meeting** in Adidjan, Côte d'Ivoire. He also participated in a panel discussion on "**The Africa Young Leaders Want."**

Mr Thierry Zomahoun, H.E. Paul Kagame, President of Rwanda and Prof. Neil Turok

PARTNERSHIP DEVELOPMENT

AIMS partnership with the **Federation of African Women Educationalists (FAWE)** was formalised with a MoU on 16 March 2015. This is a critical gender equality partner for AIMS with joint opportunities to enhance targeted outreach and public engagement that would encourage younger girls to study STEM. FAWE will also collaborate with AIMS to deliver gender responsive pedagogy within the Teacher Training program in Cameroon.

On 4 June 2015, as part of the official launch of the **AIMS MasterCard Foundation Scholars program**, AIMS organised a panel discussion entitled "**Investing in STEM for Africa's future"** on the margins of the World Economic Forum (WEF) in Cape Town, South Africa. The panel featured H.E. Naledi Pandor, Minister of Science and Technology, South Africa; Mr Thierry Zomahoun, AIMS President and CEO; Prof. Phillip Clay, former Chancellor of MIT and member of The MasterCard Foundation Board of Directors; and Dr Tolu Oni, a 2015/16 Next Einstein Forum Fellow. The panel was moderated by the BBC's Alan Kasujja, Presenter of *Newsday*. H.E. Gaston Barban, Canada's High Commissioner to South Africa, gave an introductory speech.

Signing of the MoU between the African Union Commission and AIMS

The panellists at the AIMS MasterCard Foundation Scholars Program Launch

The **African Union Commission (AUC)** and AIMS signed a MoU aimed at strengthening the teaching and learning of STEM on the African continent. The signing took place at the headquarters of the AUC in Addis Ababa, Ethiopia on 30 June 2015. The AUC-AIMS MoU will serve as a critical tool for the implementation of the ten-year Science, Technology and Innovation Strategy for Africa (STISA-2024), adopted by the Assembly of Heads of State and Government of the African Union in June 2014. Among the areas of collaboration are strengthening linkages between STEM education and research with industry; and working together on the Next Einstein Forum (NEF).

NEXT EINSTEIN FORUM

An AIMS initiative in partnership with the Robert Bosch Stiftung

The first meeting of the NEF Scientific Program Committee in Cape Town, January 2015

In the past year, the Next Einstein Forum (NEF) achieved several important milestones. The NEF's first Global Gathering 2016 was confirmed for 8 to 10 March 2016 in Dakar, Sénégal by host President H.E. President Macky Sall.

The NEF International Steering Committee (ISC) held its second meeting in Berlin, Germany on 10 October 2014 to set the operational and strategic direction of the NEF, particularly to set targets related to the NEF Global Gathering 2016.

In early 2015, the first meeting of the NEF Scientific Program Committee (SPC) was held on 14 to 15 January 2015 in Cape Town, South Africa, with over 15 of 20 members in attendance, including scientists from across the world. The SPC is responsible for providing
scientific leadership for the NEF, including the selection of topics and speakers for each NEF Global Gathering.

The SPC also oversees the NEF Fellows Program which selects Africa's 15 top scientists, under the age of 42, to be showcased at NEF Global Gatherings and globally as the face of the NEF; in conjunction with the NEF Fellows Program, the SPC also confirms the appointment of 54 NEF Ambassadors, who are the NEF public engagement ambassadors in each African country. The first round of selection for the NEF Fellows Program was launched in April 2015 and selection will be completed by July 2015.

Important to meeting the NEF's ambition of becoming Africa's global science and technology platform are strategic partnerships that advance Africa's science agenda. As such, this year, the NEF secured a growing number of private sector and civil society partners from across the world who are passionate about positioning Africa's scientific community as an influential member in the global scientific community, which will ensure sustainable human development in Africa and other parts of the world. Institutional partnerships were established with the African Union, the Governments of Senegal, South Africa and Rwanda, UNESCO and Johnson and Johnson, in addition to the founding partnership with the Robert Bosch Stiftung.

The NEF also secured memberships. NEF members serve as the brain trust of NEF and current members include the African Academy of Sciences, the African Centre for Technology Studies, Elsevier, the European School of Management Technology and NORRAG.

The NEF team has been building the NEF Global Gathering 2016 agenda to make it science-based with heavy emphasis on encouraging participation of young people and women (as participants and speakers) and increased interaction. The NEF will seek to demonstrate the impact of science to solving society's challenges in all sessions. Invitations will go out early July 2015. NEF Chairperson Thierry Zomahoun and NEF Managing Director Arun Sharma attended key conferences and meetings to share the NEF vision and get buy in from key supporters. In 2015, the NEF attended the American Association for the Advancement of Science Conference in February 2015, the Trust Africa Summit in March 2015, the Annual Meetings of the African Development Bank in May 2015, the Clinton Global Initiative Middle East and Africa in May 2015 and the World Economic Forum Africa 2015 in June 2015, to name a few.

In the next few months, the NEF plans to establish an office in Dakar, Sénégal under the leadership of the Ms Katy Cissé Wone, Deputy Managing Director. The team in Dakar will follow up with the Government of Sénégal and support the preparations of the NEF Global Gathering 2016. The NEF will also announce its NEF Fellows Class and the NEF Ambassadors as well as finalise an exciting program that we hope will set a precedent for global science forums.

FINANCE OVERVIEW

FINANCIAL REPORT 2014-2015

The African Institute for Mathematical Sciences (AIMS) was established in Cape Town, South Africa, in 2003 as a centre for postgraduate training and research in mathematical sciences for talented students from across Africa. Following the success of AIMS in South Africa, the AIMS Next Einstein Initiative (AIMS-NEI) was launched as a Pan-African network of centres of excellence. The goal of AIMS-NEI is to establish 15 centres of excellence by 2023.

These consolidated financial statements include 100% of the assets, liabilities, revenues and expenses of the following entities:

- AIMS South Africa;
- AIMS Sénégal;
- AIMS Ghana;
- AIMS Cameroon;
- AIMS Tanzania;
- AIMS Next Einstein Initiative Foundation (Canada);
- AIMS Next Einstein Initiative Foundation (UK);
- AIMS Next Einstein Initiative Foundation (Germany);
- AIMS Next Einstein Initiative Foundation (UK) (Secretariat in South Africa).

During the fiscal year ended 30th June 2015, our total revenues increased by 16% to $ 14.7 million from $ 12.6 million during the previous year. Restricted revenues increased to $ 14.3 million from $ 11.6 million in the previous year. Unrestricted revenues and investment income were lower at $ 0.4 million in the current year from $ 1 million in the previous year.

Our total expenses increased by 30% to $ 15.3 million from $ 11.8 million for the previous year. These expenses are broken down into program and non-program expenses as outlined below:

Total program expenses increased by 18% to $ 12 million from $ 10.2 million for the previous year due mainly to the additional Research Chairs in Academic and educational support, and the IDRC/DFID mid-term evaluation in Monitoring and evaluation.

Total non-program expenses increased by 103% to $ 3.3 million from $ 1.6 million. Overall, there was a deficit of $ 0.6 million against a surplus of $ 0.9 million for the previous year for a negative change of $1.5 million. This is due to the increased spending on infrastructure including the recruitment of new staff and investment in Information Technology.

Our **ratio of program expenses to non-program expenses** stood at 79/21 in the current year against 86/14 in the previous year.

Our full consolidated financial statements, audited by Deloitte LLP, are available on our website www.nexteinstein.org

Boubacar Ba
Senior Finance Manager

Deloitte LLP
5140 Yonge Street
Suite 1700
Toronto ON M2N 6L7
Canada

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REPORT OF THE INDEPENDENT AUDITOR ON THE SUMMARY CONSOLIDATED FINANCIAL STATEMENTS

TO THE DIRECTORS OF AFRICAN INSTITUTE FOR MATHEMATICAL SCIENCES – NEXT EINSTEIN INITIATIVE FOUNDATION (CANADA)

The accompanying summary consolidated financial statements, which comprise the summary consolidated statement of financial position as at June 30, 2015, the summary consolidated statement of operations for the year then ended, and the related note are derived from the audited consolidated financial statements of African Institute for Mathematical Sciences - Next Einstein Initiative Foundation (Canada) (the "Organisation") for the year ended June 30, 2015. We expressed an unmodified opinion on those consolidated financial statements in our report dated May 6, 2016. Those consolidated financial statements, and the summary consolidated financial statements, do not reflect the effects of events that occurred subsequent to the date of our report on those consolidated financial statements.

The summary consolidated financial statements do not contain all the disclosures required by Canadian accounting standards for not-for-profit organisations. Reading the summary consolidated financial statements, therefore, is not a substitute for reading the audited consolidated financial statements of the Organisation.

MANAGEMENT'S RESPONSIBILITY FOR THE SUMMARY CONSOLIDATED FINANCIAL STATEMENTS

Management is responsible for the preparation of a summary of the consolidated financial statements on the basis described in the Note to the summary consolidated financial statements.

AUDITOR'S RESPONSIBILITY

Our responsibility is to express an opinion on the summary consolidated financial statements based on our procedures, which were conducted in accordance with Canadian Auditing Standards ("CAS") 810, "Engagements to Report on Summary Financial Statements".

OPINION

In our opinion, the summary consolidated financial statements derived from the audited consolidated financial statements of the Organisation for the year ended June 30, 2015 are a fair summary of those consolidated financial statements, on the basis described in the Note to the summary consolidated financial statements.

Deloitte LLP

Chartered Professional Accountants
Licenced Public Accounts
July 14, 2016

AFRICAN INSTITUTE OF MATHEMATICAL SCIENCES – NEXT EINSTEIN INITIATIVE FOUNDATION (CANADA)

SUMMARY CONSOLIDATED STATEMENT OF FINANCIAL POSITION AS AT JUNE 30, 2015

(Stated in thousands of US dollars)

	2015	2014
	$	$
Assets		
Current assets		
Cash	**8,017**	1,575
Investment	**787**	932
Accounts and contributions receivable	**657**	1,287
Harmonised Sales Tax receivable	**40**	5
Prepaid and other expenses	**135**	266
	9,636	4,065
Investments	**391**	348
Capital assets	**4,436**	4,453
	14,463	8,866
Liabilities		
Current Liabilities		
Accounts payable and accrued liabilities	**1,094**	859
Deferred contributions	**7,721**	1,761
	8,815	2,620
Net assets		
Invested in capital assets	**4,436**	4,453
Endowment	**391**	348
Unrestricted	**821**	1,445
	5,648	6,246
	14,463	8,866

The accompanying note to the summary consolidated financial statements is an integral part of this summary consolidated financial statement.

AFRICAN INSTITUTE OF MATHEMATICAL SCIENCES – NEXT EINSTEIN INITIATIVE FOUNDATION (CANADA)

SUMMARY CONSOLIDATED STATEMENT OF OPERATIONS AS AT YEAR ENDED JUNE 30, 2015

(Stated in thousands of US dollars)

	2015	2014
	$	$
Revenue		
Restricted	**14,298**	11,617
Unrestricted	**335**	898
Investment and other income	**25**	133
Total revenue	**14,658**	12,648
Expenses		
Program Expenses		
Taught Master's and research program	**5,703**	6,219
Academic and educational support	**1,162**	791
Monitoring and evaluation	**159**	71
Industry initiative	**46**	118
Public engagement and partnership development	**1,037**	2,019
Program support	**1,657**	-
Alumni engagements	**18**	24
Centre development	**634**	929
Co-op Master's program	**251**	-
Teacher's training program	**709**	-
Next Einstein Forum	**645**	-
	12,021	10,171
Non-program expenses		
Administrative and fund raising expenses	**3,261**	1,605
Total expenses	**15,282**	11,776
(Deficiency) excess of revenue over expenses	**(624)**	872

NOTE TO THE SUMMARY CONSOLIDATED FINANCIAL STATEMENTS

BASIS OF PRESENTATION

African Institute for Mathematical Sciences - Next Einstein Initiative Foundation (Canada) has prepared these summary consolidated financial statements to be included in its annual report. These summary consolidated financial statements present an aggregated view of the same information as contained in the audited consolidated financial statements, except that they do not include the consolidated statement of changes in net assets, the consolidated statement of cash flows and the notes to the consolidated financial statements. Complete audited consolidated financial statements for the year ended June 30, 2015 are available upon request.

GOVERNANCE STRUCTURE

AIMS INTERNATIONAL BOARD OF DIRECTORS

The AIMS network is governed by an international board of directors – the IBOD who serve as the legal 'parent' of each local entity. The day-to-day operations of each entity are governed by a local board.

Increasing the number of women on the IBOD is a priority. There is an ongoing search (with a strong pipeline in place) for women with finance and legal expertise.

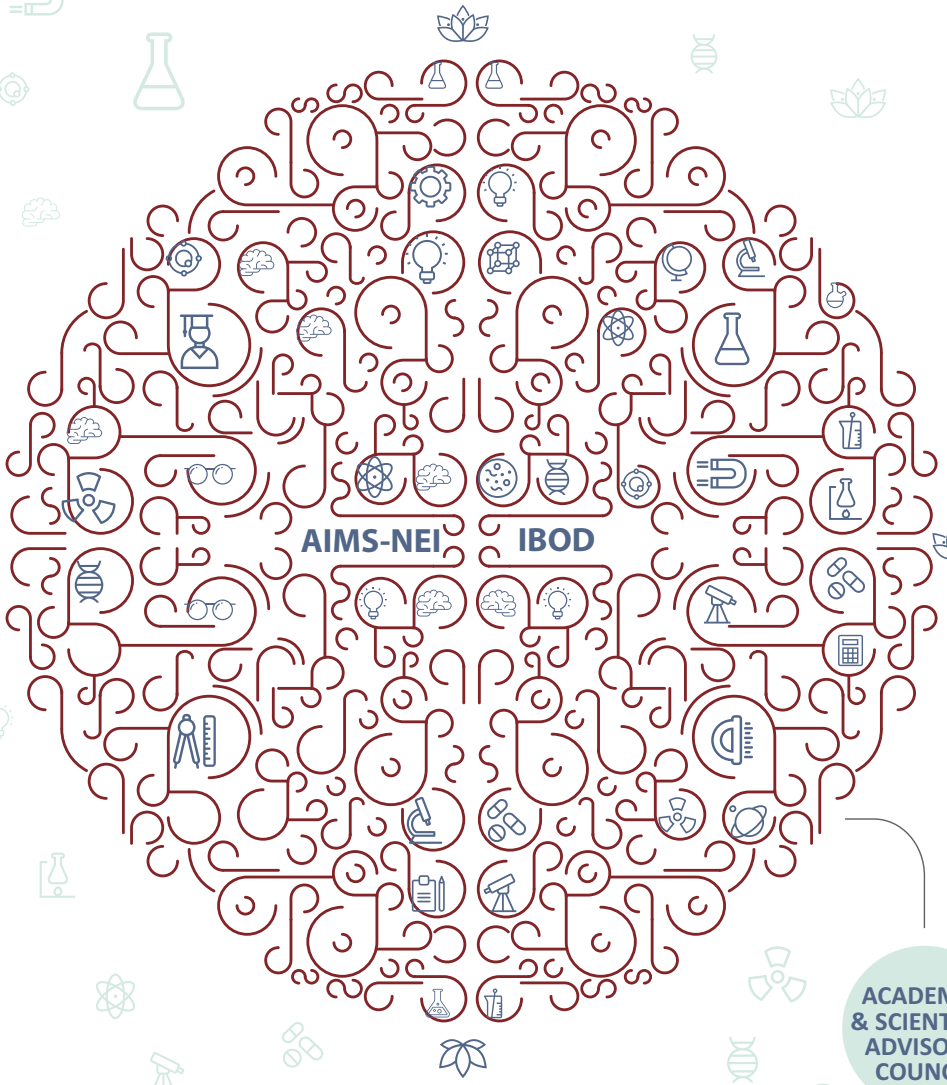
Prof. Neil Turok, Chair

Prof. Howard Alper

Mr Mohammed Gharbi

Prof. Keith Moffatt

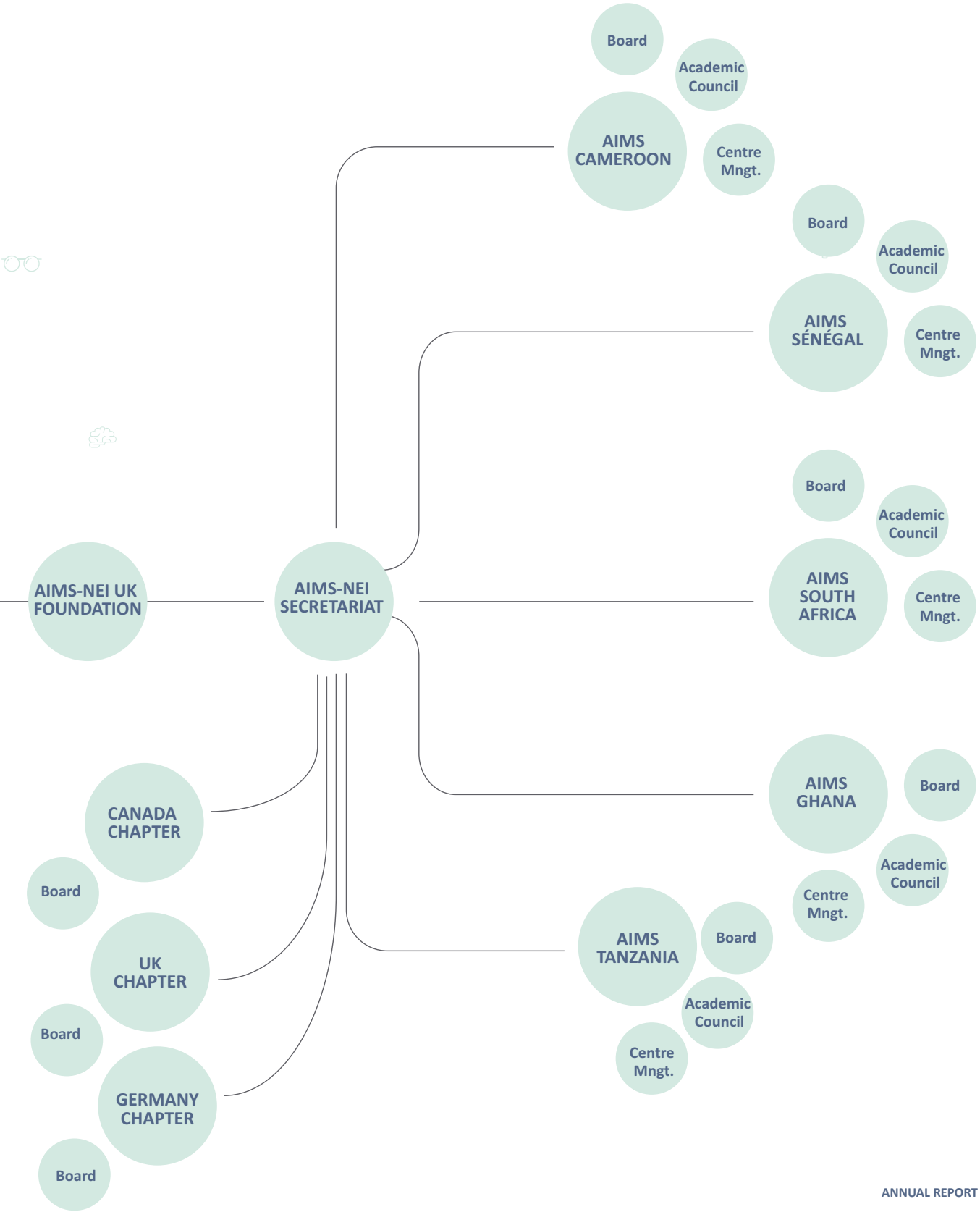
Prof. Fernando Quevedo



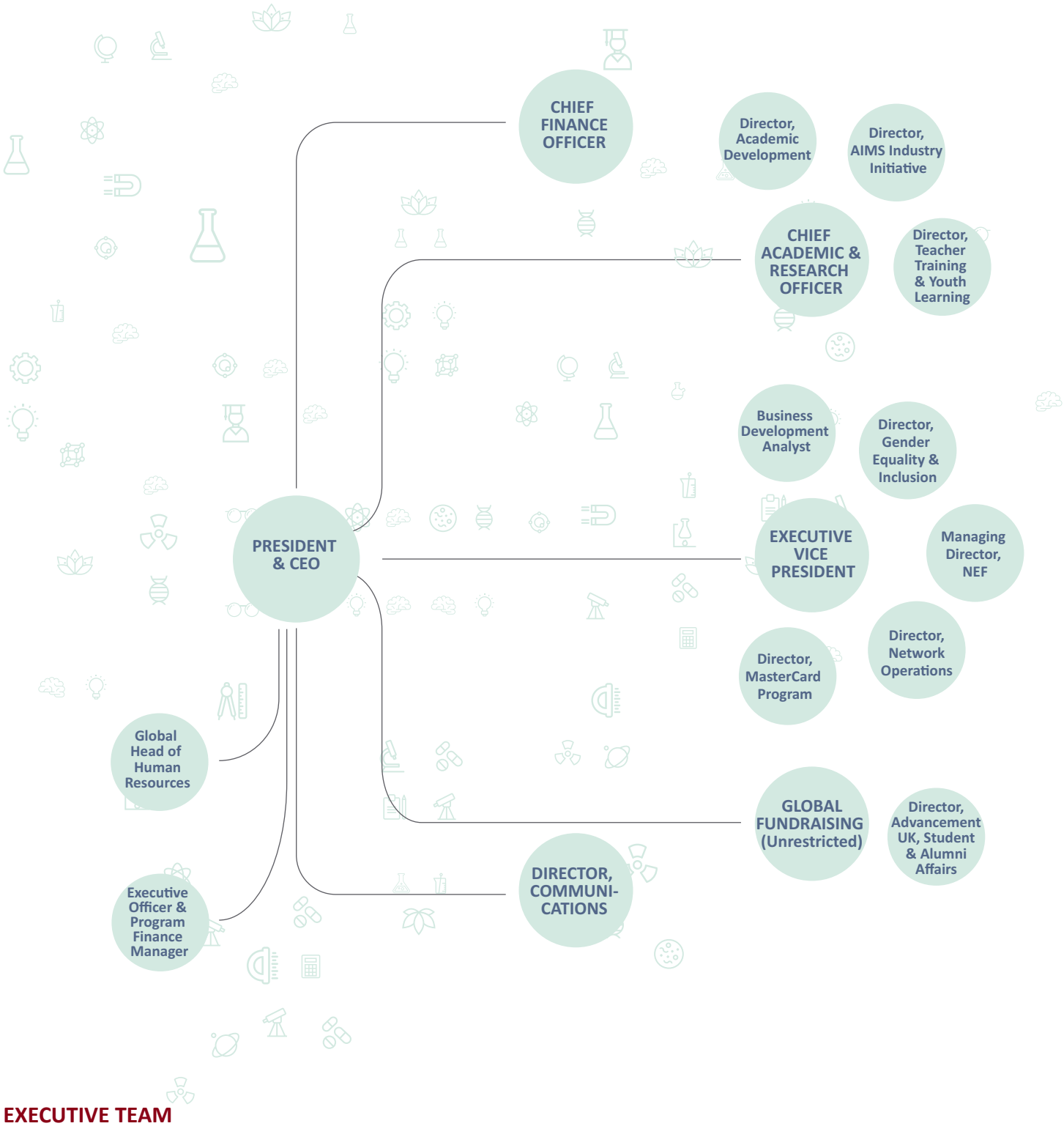
GOVERNANCE OF THE AIMS ACADEMIC AND RESEARCH PROGRAMS

During this reporting period, Prof. Barry Green, AIMS-NEI Chief Academic and Research Officer, finalised the framework for the governance of the academic and research programs at AIMS, which ensures a more strategic and coordinated approach across the network. The following committees have been established and are aimed at facilitating an exchange of ideas and experiences, sharing responsibilities, and enabling collective planning:

- Network Academic and Research Forum
- Academic Committee
- Academic Development Sub-Committee
- Quality Assurance Sub-Committee
- Research and Innovation Committee
- Teacher Training Committee



AIMS-NEI ORGANISATIONAL CHART 2014-2015



EXECUTIVE TEAM

Mr Thierry Zomahoun, President & CEO

Dr Dorothy Nyambi, Executive Vice President

Mr Lalit Varma, Chief Financial Officer

Prof. Barry Green, Chief Academic & Research Officer

OUR PARTNERS

AFRICAN GOVERNMENT PARTNERS

FUNDING PARTNERS

Canada IDRC CRDI The MasterCard Foundation SCHOLARS PROGRAM

UKaid from the British people Google Federal Ministry of Education and Research Alexander von Humboldt Stiftung/Foundation

Robert Bosch Stiftung DAAD

ACADEMIC PARTNERS

CIMPA The CSIR Durham University ENS DE LYON GOETHE UNIVERSITÄT FRANKFURT AM MAIN Maynooth University

MICHIGAN STATE UNIVERSITY NANYANG TECHNOLOGICAL UNIVERSITY Newcastle University PERIMETER INSTITUTE FOR THEORETICAL PHYSICS SFU SIMON FRASER UNIVERSITY

SISSA Université de Montréal HST UBC UNIVERSITY OF CAMBRIDGE

THE UNIVERSITY OF CHICAGO UNIVERSITY of GUELPH ILLINOIS The University of Nottingham

OXFORD uOttawa UNIVERSITÉ PARIS SUD University of Victoria UNIVERSITY OF WATERLOO

POLICY PARTNERS

ADEA

INDUSTRY PARTNERS

BlackBerry Dundee Precious Metals ikagel &sonatel

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AIMS | African Institute for Mathematical Sciences

5 Centres

AIMS Cameroon,
AIMS Ghana,
AIMS Sénégal,
AIMS South Africa,
AIMS Tanzania

960 Alumni

Since 2003.
Over 31% women

42 Countries

Represented by
African students

AIMS Next Einstein Initiative
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www.nexteinstein.org

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