

LECTURES

Our high-profile lecture programme lends the festival its trademark international flavour, and we are proud to welcome the world's most esteemed scientists, as well as South Africa's young researchers, to our celebration of science.



AUDIENCE: Grade 10+

CAPACITY: 200/900

PRICE: R25

Start	End	Speaker, Organisation	Title
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WEDNESDAY, 2 MARCH

13h00	14h00	Habib Noorbhai , Cape Peninsula University of Technology <i>The evolution of the backlift batting technique in cricket</i>	Monument Olive Schreiner Hall
15h00	16h00	Professor Mike Bruton , Mike Bruton Imagineering <i>Who was South Africa's greatest inventor?</i>	Monument Olive Schreiner Hall
18h30	19h30	Lucy Hunt , University of Texas, USA <i>Levelling the playing field: How the length of acquaintanceship predicts attractiveness</i> Please note: This lecture will be presented via Skype	Monument Olive Schreiner Hall

THURSDAY, 3 MARCH

13h00	14h00	Clarice Greyling , Hoërskool Waterkloof, Pretoria <i>The value of human figure drawings in the detection of learning difficulties</i>	Monument Olive Schreiner Hall
15h00	16h00	Case Rijdsdijk , Astronomical Society of Southern Africa <i>Telescopes as time machines</i>	Monument Olive Schreiner Hall
18h30	19h30	Professor Eric Wilcots , University of Wisconsin-Madison, USA <i>Welcome to the neighbourhood: Searching for habitable worlds around other stars</i>	Monument Olive Schreiner Hall

FRIDAY, 4 MARCH

13h00	14h00	Jim Adams , NASA, USA <i>Spinoff 2016: Forty years of investing in space and changing life on Earth</i>	Monument Olive Schreiner Hall
15h00	16h00	Yolanda Nkala , Centre of Science and Technology, Cape Town <i>Innovation: The future through disruptive, young minds</i>	Monument Olive Schreiner Hall
Brian Wilmot Lecture Please note: This lecture forms part of the Scifest Africa Official Opening			
18h30	20h30	Wendy Sadler , science made simple (sms), UK <i>Demo to democracy: How science communication can change the world</i>	Monument Guy Butler Theatre

SATURDAY, 5 MARCH

13h00	14h00	Shagita Gounden , Square Kilometre Array (SKA) SA <i>The Square Kilometre Array radio telescope: Searching for the origins of the Universe</i>	Monument Olive Schreiner Hall
Christina Scott Memorial Lecture			
18h30	19h30	Dan Goods , NASA, USA <i>From comets to giant sea shells: When NASA and art collide</i>	Monument Olive Schreiner Hall

SUNDAY, 6 MARCH

13h00	14h00	Kate Robey , Council for Geoscience <i>The role of groundwater in South Africa: Current and emerging issues</i>	Monument Olive Schreiner Hall
18h30	19h30	Janet Kalis , Rhodes University <i>Unravelling a triple helix of knowledge: Exploring the genealogy of the clans on the Wild Coast of the Eastern Cape</i>	Monument Olive Schreiner Hall

MONDAY, 7 MARCH

13h00	14h00	Professor William Edmonson , National Institute of Aerospace, USA <i>The big picture: Systems thinking and its importance for innovation</i>	Monument Olive Schreiner Hall
18h30	19h30	Ella Al-Shamahi , University College London, UK <i>Fossil hunting in Yemen: Exploring early human migration and Neanderthals in unstable territories</i>	Monument Olive Schreiner Hall

TUESDAY, 8 MARCH

13h00	14h00	Jim Adams , NASA, USA <i>Solving the technological challenges of the Journey to Mars</i>	Monument Olive Schreiner Hall
15h00	16h00	Dr Robb Gess , Albany Museum <i>The unusual coelacanth fossil find</i>	Monument Olive Schreiner Hall

WEDNESDAY, 2 MARCH

13H00 14H00

Habib Noorbhai**Cape Peninsula University of Technology**

The evolution of the backlift batting technique in cricket



In the sport of cricket, the batting technique consists of various elements, namely the grip, stance, backlift, initiation, impact with the ball and follow through. While extensive research has been done about batting technique, very little research has been done about the backlift specifically.

Habib Noorbhai, a registered biokineticist who has had the pleasure of working with international teams, will take you through the evolution of the backlift batting technique, and by looking at the technique of the most successful batsmen over the last century, introduce the theory that the most effective technique may not necessarily conform to the traditional taught technique and coaching literature. He will also introduce innovations that have resulted from his research involving cricketers and coaches, namely a new cricket bat developed in collaboration with Professor Tim Noakes and Russell Woolmer to help young players hit the ball more effectively, and an app that helps to analyse and improve the backlift among cricketers at all levels.

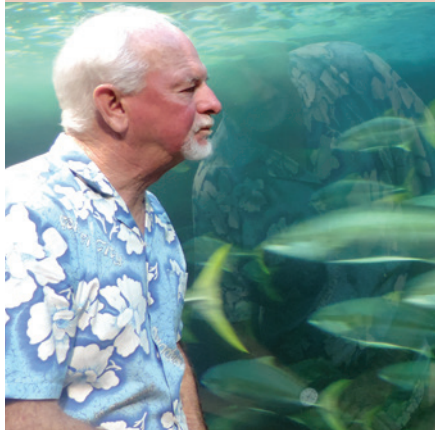
Habib has a BA in Sport Psychology, Honours in Biokinetics and MPhil in Biokinetics, and is currently doing his PhD in Exercise Science at the University of Cape Town. He is a researcher and lecturer at the Cape Peninsula University of Technology, a registered biokineticist, biokinetics expert for Health24, humanitarian and motivational speaker. Habib loves cricket (obvious), but also Brazilian coffee, comedy, hiking and reading. In 2013, he was voted as one of South Africa's 100 Brightest Young Minds, and in 2015 he was nominated as one of the *Mail and Guardian* 200 Young South Africans. He did not submit it in his biography, but we also happen to know Habib is a Mister South Africa 2016 contestant.

Habib believes that correct action starts with the correct thinking and correct thinking starts with a correct mindset. As the founding Director of the non-profit company, The Humanitarians, which implements exercise and health outreach programmes in Cape communities, Habib has put his money where his mouth is and demonstrates he is clearly a man of action.

15H00 16H00

Professor Mike Bruton**Mike Bruton Imagineering**

Who was South Africa's greatest inventor?



Did you know that the dolos, CAT Scan, prepaid airtime, Kreepy Krauly, speed gun and Pratley Putty are all famous South African inventions? South Africans are highly adaptable and innovative people and we can be justly proud of our significant contributions to the advance of technology. But who was our greatest inventor? There are many candidates, men and women, from the lesser acknowledged inventors of bygone ages who used their indigenous knowledge to develop foodstuffs, grooming products, medicines and tools, to modern inventors who made advances in these fields or whose inventions led to modern fields such as biotechnology, communications, energy, nanotechnology, transport and space science.

Come along and play a role in deciding who was our greatest inventor, and once you have decided, why not join Mike for a walkthrough of the "Great South African Inventions" interactive exhibition at Scifest Africa?

Professor Mike Bruton has been interested in innovation since he was involved, as former Director of the JLB Smith Institute of Ichthyology (now the South African Institute for Aquatic Biodiversity), in encouraging his researchers to be novel and creative in their approach to science. In 2004, he developed an exhibition titled "Great South African Inventions" at the MTN Sciencentre (now the Cape Town Science Centre) as part of the science centre's celebration of ten years of democracy. This exhibition was highly successful and Mike was encouraged to use his research to write a book with the same title, which was published in 2010. He recently developed a new exhibition on this topic and is writing a book titled *Inventions of the Rainbow Nation* to be published by Jacana Media in 2017.

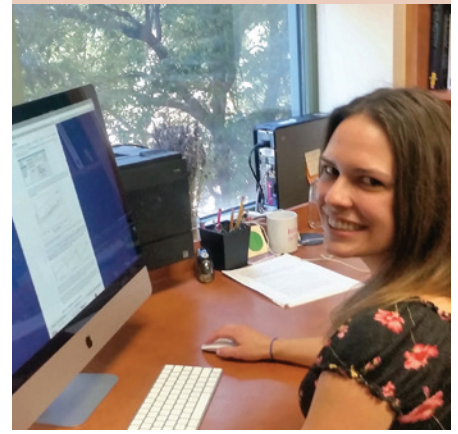
Mike works as a consultant, offering expert services in the fields of aquatic research management, authorship, imagineering, museum and science centre development, and public talks on science, technology, innovation and the environment. He owns crazy collections of unique artworks depicting coelacanths, laundry pegs and stamps.

This lecture is sponsored by SAASTA.

18H30 19H30

Lucy Hunt**University of Texas, USA**

Levelling the playing field: How the length of acquaintanceship predicts attractiveness



Assortative mating is the tendency for individuals to select mates who are similar to themselves in certain observable characteristics, for example culture, height or profession. How humans select a mate has received robust attention from nearly every discipline of social science, with researchers examining overlapping portions of the mating process and contributing their own theoretical perspectives, methodologies and conclusions. However, studies resulting from this research have not yet decisively linked a theoretical framework to the mechanism underlying assortative mating patterns.

How does the mating process work, how do we determine that someone is hot or not, and how does our definition of 'hot' change over time?

Lucy Hunt will outline her study that examines how the selection of a mate based on attractiveness, and the definition of attractiveness, shifts depending on the length of time that a couple were acquainted before dating.

Lucy Hunt is a PhD student in Human Development and Family Sciences at the Attractions and Relationship Research Lab, University of Texas, USA. Her research interests include initial attraction processes, dating and mate selection, and she is currently researching how we form an impression of a member of the opposite sex in our initial encounter with them. Lucy is part of a group of postgraduate students at the university that produces podcasts for their website thoselovegeeks.com, because they believe people should have access to scientific information about human attraction and relationship trends. In her spare time, Lucy enjoys riding horses and herding cattle in Montana.

Please note: This lecture will be presented via Skype.

THURSDAY, 3 MARCH

13H00 14H00

Clarice Greyling**Hoërskool Waterkloof, Pretoria**

The value of human figure drawings in the detection of learning difficulties



Many Grade 1 learners in South Africa are at a disadvantage when starting school, because they have not yet developed the necessary academic, emotional, motor or social skills expected of them by this stage. But Grade R educators are also at a disadvantage, as they only have limited knowledge, skills and tools to be able to detect possible learning difficulties and assist these children by referring them to professionals before Grade 1.

Clarice Greyling, a Grade 11 learner from Hoërskool Waterkloof, Pretoria, was awarded the Scifest Africa Prize for Science Communication at the 2015 Eskom Expo for Young Scientists International Science Fair, for the presentation of her research that investigated how human figure drawings can assist Grade R educators in the detection of learning difficulties of their learners. In this lecture, Clarice will provide the context of her project, summarise existing background research, explain her hypothesis, walk audiences through her research and method, discuss her results, and inspire others to participate in the Eskom Expo for Young Scientists.

Clarice is a very passionate 16-year-old who wants to make a BIG difference in the world, and believes that one should not ask for change, but be the change. She has spent many hours volunteering at her mom's school for children with disabilities, where she learned that every child is valuable, and while she is not yet sure what she wants to study, she knows it will involve helping children. Clarice enjoys public speaking, reading, volunteering, and spending as much time as possible with her friends, but one of her biggest passions is dancing, and she is currently training to represent South Africa at the World Dance Championship in Austria and Germany.

15H00 16H00

Case Rijdsdijk**Astronomical Society of Southern Africa**

Telescopes as time machines



Telescopes collect light, and in their simplest form, produce an image of a planet, star or galaxy. The light can also be analysed using various methods such as photometry and spectroscopy to determine various characteristics of the object we are viewing like the distance, age, composition and temperature. But light has a finite speed, and so the further away the object we are viewing is, the longer it takes for the light to get to us. In other words, telescopes allow us to look back in time.

Join Case Rijdsdijk, astronomer and Scifest Africa legend, for a journey back in time, as he looks at how telescopes allow us see objects as they were when the light left them, as well as some other unexpected spinoffs!

Case Rijdsdijk has not retired, he has simply ceased formal employment, and still hates ties. He studied astronomy under Professor Richard Stoy, Astronomer Royal at the Royal Observatory at the Cape (now the South African Astronomical Observatory), and after teaching at leading schools in Southern Africa, returned to the SAAO in 1995 where he initiated the observatory's Science Education Initiative, managed major outreach programmes for the Department of Science and Technology, SAAO and South African Institute of Physics, and was involved in the development and design of several astronomy and science centres around the world.

Case is Vice-President and a honorary member of the Astronomical Society of Southern Africa and a honorary member of the Royal Society of South Africa. He has received several awards and is the only recipient of a prestigious National Science and Technology Forum Special Award for his contribution to science, technology and innovation through science communication and education over a lifetime. Case has been involved in Scifest Africa since its inception in 1996 and is a member of the Scifest Africa Advisory Committee.

18H30 19H30

Professor Eric Wilcots**University of Wisconsin-Madison, USA**

Welcome to the neighbourhood: Searching for habitable worlds around other stars



Around the time of the first Scifest Africa, astronomers reported a remarkable discovery of an object two and half times the mass of the largest planet in our Solar System, orbiting around a nearby star. This discovery marked the beginning of a revolution in our understanding of planets and planetary systems, and today we know of nearly 5,500 planets orbiting stars in our galaxy. But what are these planets like and could they sustain life? And how can we answer these questions? Let Professor Eric Wilcots, Professor of Astronomy at the University of Wisconsin-Madison, USA, take you on a search for and exploration of other planets in our Galactic neighborhood.

Growing up in Philadelphia, Eric's love of astronomy began when he saw the rings of Jupiter through a small telescope in his backyard. From that beginning, he pursued his interest, and earned his BSc from Princeton University and a PhD in Astronomy at the University of Washington. Eric was a Jansky Postdoctoral Fellow at the National Radio Astronomy Observatory for three years, before joining the faculty at the University of Wisconsin-Madison. He has served on advisory committees for NASA, the National Radio Astronomy Observatory and National Science Foundation in the USA, was a member of the US Square Kilometre Array (SKA) Consortium, and currently serves on the Board of the Southern African Large Telescope (SALT). In his occasional free time, you can find him cycling, skiing or in the mountains of the American west.

This lecture is sponsored by the US Embassy in South Africa.

LECTURES

FRIDAY, 4 MARCH

13H00 14H00

Jim Adams

NASA, USA

Spinoff 2016: Forty years of investing in space and changing life on Earth



NASA's investment in aeronautics and space exploration also advances discoveries in science and technology that can be applied to protect our planet, strengthen economies and improve your life on Earth. The agency's Technology Transfer Program ensures that technologies developed for missions are made available to the public for the benefit of humankind, and in support of this, fifty of these spinoff technologies are featured in a publication every year to demonstrate the wide range of benefits from America's investment in aeronautics and space exploration. Join Jim Adams, NASA Deputy Chief Technologist, for an overview of the best spinoff stories on the 40th anniversary of this publication.

Jim has served in NASA's Office of the Chief Technologist at NASA Headquarters, Washington, DC since 2012, and is responsible for the management of the Office of the Center Chief Technologist and Center Technology Transfer Office at each NASA field centre. He came to the Office of the Chief Technologist from the agency's Science Mission Directorate at NASA Headquarters, where he served as the Deputy Director of the Planetary Science Division, overseeing the Discovery, Lunar Science, Mars and New Frontiers programmes as well as the development of several key technologies. Prior to his assignment at NASA Headquarters, Jim served at NASA's Goddard Space Flight Center, Maryland in several capacities.

Jim has worked for NASA for 26 years, has contributed to over two dozen successful currently operating space missions, and has received three NASA medals recognising exceptional service and leadership, including NASA's Outstanding Leadership Medal.

Jim holds a BSc in Physics from Westminster College and a MSc in Electrical Engineering from Villanova University.

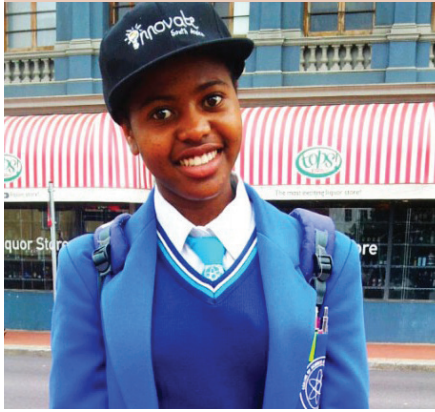
Apparently Jim bakes a mean apple pie, but this is yet to be confirmed by the Director of Scifest Africa.

15H00 16H00

Yolanda Nkala

Centre of Science and Technology, Cape Town

Innovation: The future through disruptive, young minds



In order to ensure the effective use of science, technology and innovation to improve our quality of life, South Africa will need a network of disruptive thinkers who have a unique insight into our socio-economic challenges, are not afraid to be different, and will develop unique processes, products, programmes, services and technologies that will have real impact on a systemic level.

The first full series of scans of the developing adolescent brain by the US National Institutes of Health showed that the adolescent brain undergoes a massive reorganisation between ages 12 and 25, and that adolescents are less inhibited and more adaptable in this time.

In this lecture, Yolanda Nkala, a 17-year-old award-winning app developer and social entrepreneur, will describe the various apps she has developed, share how you can get involved in this network of disruptive thinkers, innovators and entrepreneurs, and defend why she thinks the youth are the key to innovation and a better life for all.

Yolanda is a Grade 12 learner at the Centre of Science and Technology in Cape Town, and changes her mind daily about whether she wants to study and follow a career in IT or medicine. We know she will be absolutely fabulous at both. Yolanda (and her team, she is quick to add) not only developed an award-winning transport app for last year's innovate SA challenge, but she (and her research partner) has been selected to represent South Africa at the 2016 Beijing International Science Fair for her Eskom Expo for Young Scientists project titled *Reducing mycotoxins on umbona* (maize). Yolanda's desire to innovate is inspired by the hardship she witnesses in her community in Khayelitsha in Cape Town, and her action to find solutions to these problems saw her voted as one of the 2015 *Mail & Guardian* 200 Young South Africans Rising Stars.

18H30 19H30

Wendy Sadler

science made simple (sms), UK

Demo to democracy: How science communication can the world



Brian Wilmot Lecture

Science demonstrations are at the heart of any science festival, and one of the most effective ways to engage a variety of audiences in science in any setting. But are science communicators just messing around with buckets, custard and straws? With plenty of demonstrations and audience interaction, Wendy Sadler, a regular contributor to Scifest Africa, will reflect on how science communication and science festivals are building bridges between the public and scientists and changing the world.

Wendy is a physicist and the founding Director of science made simple (sms), an award-winning social enterprise built around a love of science demonstrations and interaction, that offers science shows to schools and families across the UK and around the world. The company is on a serious mission to use visual tools and performance skills to inspire the next generation of scientists and raise the profile of science within popular culture, and has brought science to life for over 650,000 people in over 30 countries.

Science made simple also works in collaboration with a diverse range of partners to tackle some of the barriers to human capital development in science, from the ability of scientists to communicate, to the inequality in science education that affects the aspirations of learners from disadvantaged areas, to the shortage of research on the long-term impact of science engagement.

Wendy is also employed as a lecturer at Cardiff University and is a partner of The Training Group that specialises in public engagement training for researchers. She is a former Chair of Women into Science and Engineering (WISE) in Wales, and currently serves as a member of the Science Advisory Council for Wales. Wendy is one of the UKRC's Women of Outstanding Achievement and a former Welsh Woman of the Year for Science and Technology.

This lecture is sponsored by the British High Commission in South Africa

Please note: This lecture forms part of the Scifest Africa Official Opening

SATURDAY, 5 MARCH

13H00 14H00

Shagita Gounden

Square Kilometre Array (SKA) SA

The Square Kilometre Array radio telescope:
Searching for the origins of the Universe

The Square Kilometre Array project is an international enterprise to build the largest and most sensitive radio telescope in the world, and represents a landmark in humankind's quest for understanding the origin, nature and evolution of the Universe. With thousands of dishes extending out to a distance of 3,000 km from a concentrated central core outside Carnarvon in the Northern Cape, and low-frequency array telescopes built in Western Australia, the SKA will have a total collecting area of approximately one square kilometer.

Meet Shagita Gounden, a computer engineer at SKA SA and one of the 2015 *Mail & Guardian* 200 Young South Africans, and find out what we intend to discover with the SKA and how South Africa, together with a number of countries across Africa, plan to develop expertise and next-generation technologies that will bring scientists to the cradle of humankind to seek the origins of the Universe.

Shagita completed her BEng in computer engineering with honours at the University of Pretoria, and worked to provide software solutions for complex problems at Eskom and Siemens, before being appointed as a signal analyst by the CSIR and SKA SA. She admits to having some serious "wow" moments at SKA SA that have converted her to a science geek, like the first time she saw one of the MeerKAT radio telescope dishes on site outside Carnarvon, or when she realised that SKA will be the first to deal with data on this scale, for the country and the world. In her spare time, Shagita runs marathons and half-marathons, because she can.

This lecture is sponsored by SKA SA.

18H30 19H30

Dan Goods

NASA, USA

From comets to giant sea shells: When NASA and art collide



Christina Scott Memorial Lecture

Dan Goods wants you to experience something beautiful, meaningful and profound that will alter your way of observing the world. As a visual strategist at NASA's Jet Propulsion Laboratory (JPL) in Los Angeles, Dan uses various media to translate complex scientific concepts, the work of NASA scientists, and mission discoveries into tangible forms and experiences that tell a story and make scientific information accessible and understandable to the public.

Dan will share his journey from art school to NASA, let you see science through his eyes, introduce you to some of his team's big ideas and unique projects that can be found from public spaces around the world to outer space, and show you particles that have come from outer space.

If you ask him really nicely, and because he is such a good guy (get it?), Dan may even take you on a walkthrough of one of his big ideas installed at Scifest Africa.

During the day, Dan shepherds an amazing team of artists, designers, makers, strategists and thinkers at The Studio, who develop creative ways to communicate science to the public. In the evening, after doing the dishes, reading bedtime stories to his three kids, and spending time with his wife, he works on other creative problem solving projects around the world.

Dan graduated valedictorian from the graphic design programme at the Art Center College of Design in Pasadena, California in 2002, and was voted as "One of the most interesting people in Los Angeles" by the *LA Weekly*.

This lecture is supported by NASA.

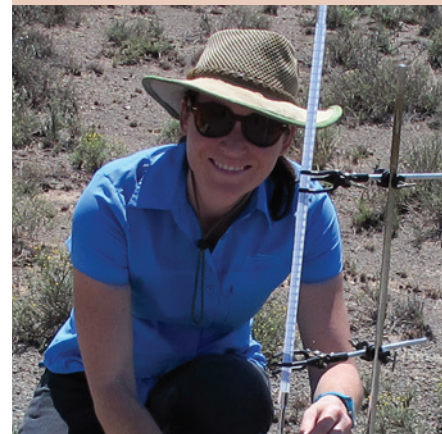
SUNDAY, 6 MARCH

13H00 14H00

Kate Robey

Council for Geoscience

The role of groundwater in South Africa: Current and emerging issues



Freshwater is essential for supporting life, and when we visualise it, we immediately think of a meandering river or a crystal blue lake, and not the resource hidden beneath our feet. In South Africa, groundwater supply may be mistakenly thought inferior, but did you know that today close to 60% of our towns depend solely or in part on groundwater? Despite this important role, groundwater resources have not received the same level of attention as surface water. But this is changing, because nearly all our surface water is already allocated, whereas groundwater is often cheaper to develop, has a larger distribution and is more resilient during drought periods.

However, the utilisation of groundwater also experiences challenges which threaten the sustainability of groundwater schemes to supply water, like the iron-related clogging of boreholes. There are also emerging issues facing groundwater, such as acid mine drainage, natural arsenic content, and the potential impacts that shale gas activities may have on the Karoo aquifers. In this lecture, Kate Robey, a hydrogeologist at the Council for Geosciences, will provide some insight into our current groundwater resources and a better understanding of the research currently being undertaken to deal with our country's current and future challenges to the sustainability of groundwater.

Kate was born in the City of Diamonds, grew up in the Mother City and studied in the City "where leaders learn". After graduating with an honours degree in Geology from Rhodes University, she joined the Council for Geoscience in Cape Town and pursued a career in hydrogeology, because she wants her research to have an immediate impact on people's lives and protect our environment. Kate has since completed a MSc in hydrogeology at the University of the Free State, and feels extremely lucky to have a job which pays her to travel across South Africa to soulful places like the Karoo.

LECTURES

SUNDAY, 6 MARCH

18H30 19H30

Janet Kalis

Rhodes University

Unravelling a triple helix of knowledge: Exploring the genealogy of the clans on the Wild Coast of the Eastern Cape



The eastern shores of the Eastern Cape have long been known as the “wild coast”, amongst other reasons, because of the numerous ships that have wrecked as a result of its rugged topography and stormy seas. IsiXhosa-speaking Bomvana and Mpondo people, many of whom continue to live according to traditional social and cultural conventions, inhabit the area. As such, they observe the ancestor religion, believing that their distant forebears and more recent progenitors have the capacity to bestow favour upon them and to cause misfortune and illness.

This lecture is based on the PhD research of Janet Kalis, lecturer in the Rhodes University Department of Anthropology, which collates oral and written historical accounts with contemporary ethnography and DNA analysis of people belonging to clans said to have descended from European shipwreck survivors and other non-African forebears.

Janet has lived in Mthatha for the past 25 years, where she has been immersed in the isiXhosa culture, not only during her fieldwork in rural areas, but also in her work at Walter Sisulu University and community life. She has deep respect for the culture and its traditions, which is reflected in her research, which aims not only to document a particular kind of historical contact between colonised and colonisers, but also to interrogate ways in which conventional divisions based on race are over-turned and to some extent undermined by the kind of cultural integration she explores.

MONDAY, 7 MARCH

13H00 14H00

Professor William Edmonson

National Institute of Aerospace, USA

The big picture: Systems thinking and its importance for innovation



Basic engineering defines a problem as an input, a process and an output, but we live in the real world, with real people and real problems that are not linear, but instead consist of multiple inputs, processes and an outputs, that operate and interact at the same time and influence one another within a larger system. Airports, ecosystems, satellites, soccer teams and even Scifest Africa are all examples of such systems. Systems thinking is a process of understanding why a problem occurs by considering the parts in relation to the whole.

Professor William Edmonson, a researcher at the US National Institute of Aerospace (NIA), will demonstrate the role systems plays in your everyday life, outline how engineers at the NIA use it for the development of autonomous satellites that can self-heal, optimise and reconfigure and enable deep space missions with little or no human interaction, and discuss how you can use it to assess and solve any problem and become part of the system of innovation in South Africa.

The NIA is a non-profit research and graduate education institute, created to conduct leading-edge aerospace and atmospheric research, develop new technologies for the USA, and help inspire the country's next generation of scientists and engineers. William is currently the NIA SP Langley Distinguished Professor in the North Carolina A&T State University Department of Electrical and Computer Engineering. He is also Director of the Center for Small Satellite Systems and Technology for Observation and Exploration at NIA, which focuses on advancing the capabilities, functionality, and scope of mission for pico-, nano-, and micro-class satellites, in order to develop satellites with a small volume and mass, that could be developed, launched and built by universities as part of research programmes, and can operate autonomously and reliably for Earth observations, disaster management or deep-space missions with little to no human interaction. Presently, William is collaborating with universities in England, Ethiopia, France, Ghana, Mexico, Peru, South Africa and Spain on research and human capacity development for small satellites development.

This lecture is supported by NASA.

18H30 19H30

Ella Al-Shamahi

University of College London, UK

Fossil hunting in Yemen: Exploring early human migration and Neanderthals in unstable territories



Searching for fossils, ruins or artefacts in unstable, hostile and disputed territories may be an adventure, but it is also cutting-edge science, and science should never have to give up and pack up for security reasons.

Ella Al-Shamahi is a National Geographic Emerging Explorer, archaeologist, palaeoanthropologist and comic who works in areas for which it is hard to get insurance. Her main work is in the epically beautiful and yet incredibly unstable country of Yemen, her family's country of origin, where her team is trying to find and excavate caves inhabited in the Palaeolithic Period. Discover what she is trying to learn about Neanderthals, why she thinks that early humans might have left Africa via land bridges across the Red Sea to Yemen, what challenges archaeologists face in the excavation and preservation of fossils, ruins or artefacts and working in unstable areas, and how stand-up comedy helps her cope with the darker side of her work.

As an archaeologist specialising in fossil hunting in caves in unstable, hostile and disputed territories, a palaeoanthropologist specialising in Neanderthals, and a stand-up comic specialising in science stand-up comedy, Ella is changing the Middle East narrative through science and humour. She has worked in unstable territories from the former USSR to Iraq, but works mostly in Yemen, where she usually wears a burka, even during field work. When not digging she is gigging, using comedy to communicate science to people in surprisingly engaging ways and as a coping strategy for the darker side of her work. Ella holds degrees from Imperial College London and University College London, where she is currently undertaking her PhD.

This lecture is sponsored by the British High Commission in South Africa.

TUESDAY, 8 MARCH

13H00 14H00

Jim Adams

NASA, USA

Solving the technological challenges of the Journey to Mars



NASA is on a Journey to Mars. A journey to seek answers to fundamental questions such as whether Mars was home to life and still is today, and how life began in the Universe and on Earth. As you read this, the agency's robotic scientific explorers, or rovers, are paving the way for us to answer these questions. But what will it take to live, survive and thrive on Mars once we have travelled there in the 2030s, and what kinds of future technologies, drawn from the arts and science fiction, might future explorers employ to meet technology challenges and answer these questions? Explore all these questions with Jim Adams, NASA Deputy Chief Technologist, as he takes you through the agency's plan for the Journey to Mars.

Jim has served in NASA's Office of the Chief Technologist at NASA Headquarters, Washington, DC since 2012, and is responsible for the management of the Office of the Center Chief Technologist and Center Technology Transfer Office at each NASA field centre. He came to the Office of the Chief Technologist from the agency's Science Mission Directorate at NASA Headquarters, where he served as the Deputy Director of the Planetary Science Division, overseeing the Discovery, Lunar Science, Mars and New Frontiers programmes as well as the development of several key technologies. Prior to his assignment at NASA Headquarters, Jim served at NASA's Goddard Space Flight Center, Maryland in several capacities.

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Jim holds a BSc in Physics from Westminster College and a MSc in Electrical Engineering from Villanova University.

Apparently Jim bakes a mean apple pie, but this is still to be confirmed by the Director of Scifest Africa.

18H30 19H30

Dr Rob Gess

Albany Museum

The unusual coelacanth fossil find



When in 1953, Professor JLB Smith was dissecting the second known specimen of the coelacanth, *Latimeria chalumnae*, where the Rhodes University Department of Geology is today, nobody could have suspected that ancient fossil coelacanths were buried on Waterloo Farm just over the hill. It took the building of the controversial road bypass south of Grahamstown in 1985, to expose black shale that was mud in a coastal estuary around 360 million years ago, to reveal the most important fossil site of its age in Africa.

Roadworks undertaken in the early 2000s to stabilise the cutting, carved away most of the richest shale, but 70 tons of this was carefully quarried out ahead of the roadworks and stored in sheds for ongoing research. It was amongst this shale that Dr Robert Gess of the Albany Museum found over 30 specimens of coelacanth babies (3-6 cm in length), which he described with Professor Michael Coates of the University of Chicago. This find provides evidence for the oldest coelacanth nursery in the world by 60 million years. The species, the oldest in Africa, was described as *Serenichthys kowiensis* (Serena's fish from the Kowie River), in September 2015.

Rob, a palaeontologist based at the Albany Museum in Grahamstown, will describe how the coastline, animals and plants of the site outside Grahamstown were different in the Devonian Period, tell the story of this breakthrough find, and outline some of what we have learned from the coelacanth fossils and other fossils found at Waterloo Farm.

Rob obtained his PhD in palaeontology from the University of the Witwatersrand, under the dual mentorship of Professor Michael Coates at the University of Chicago, and Professor Bruce Rubidge, Head of the Evolutionary Studies Institute at the University of the Witwatersrand and Chair of the DST-NRF Centre of Excellence in Palaeosciences. He is South Africa's leading researcher on Devonian (420-359 million year old) marginal marine and terrestrial ecosystems, as well as Early Vertebrates (ancient fish and early four legged creatures). The Late Devonian Waterloo Farm lagerstätten (exceptional fossil site) outside Grahamstown, continues to be his main focus of research.

