

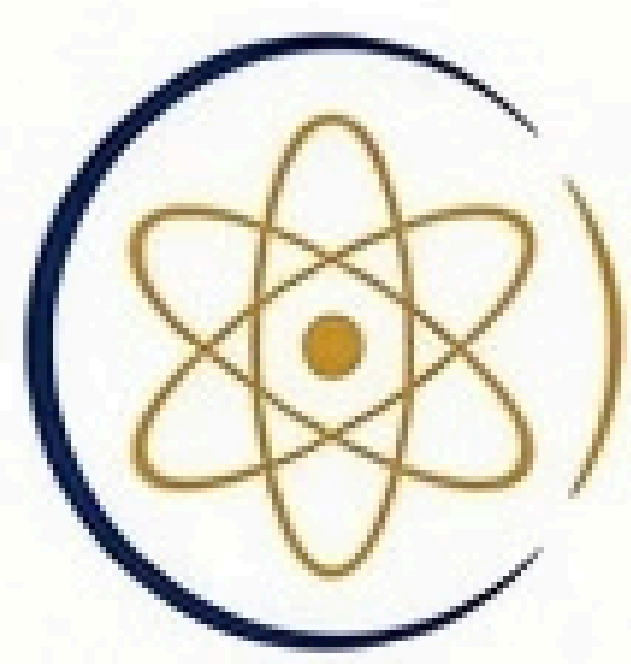
**PHYSICS AND THE FOURTH INDUSTRIAL
REVOLUTION Towards a Sustainable and
Inclusive Future**

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Technology and Innovation
(DSTI)

INSIGHTS FROM THE

70th **SAIP**
Annual Conference

SCIENCE TODAY,
A STRONGER TOMORROW



Editor's Note

By Dr Edwin Mapasha

As we step into the final stretch of 2026, the physics community in South Africa continues to demonstrate remarkable resilience, innovation and impact. From cutting-edge research in quantum science and materials physics to advancements in astrophysics, biophysics and renewable energy technologies, our community is addressing some of the most pressing scientific and societal challenges of our time.

The South African Institute of Physics remains committed to fostering excellence, collaboration and transformation across the physics landscape. Through our conferences, workshops, outreach initiatives and strategic partnerships, we create platforms for knowledge exchange, capacity building and the development of the next generation of scientists.

This issue of PC Magazine highlights some of the outstanding work being done across our institutes and universities, and celebrates the achievements of researchers, educators and students who continue to push the boundaries of discovery. We also reflect on the importance of science communication and public engagement in building a scientifically literate and inclusive society.

Looking ahead, we are excited about the opportunities that lie before us. As we prepare for the 2027 SAIP Conference and other key initiatives, let us continue to work together to strengthen our community, advance scientific knowledge and contribute meaningfully to the development of our nation and continent.

Thank you to all our members, partners and readers for your continued support and dedication to physics in South Africa.

Dr Edwin Mapasha

Editor, PC Magazine

South African Institute of Physics



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WIPIISA: EMPOWERING WOMEN IN PHYSICS, ONE GENERATION AT A TIME

“Wathint’ abafazi, wathint’ imbokodo.” – “You strike a woman, you strike a rock.”

These words, sung by the 20,000 women who marched to the Union Buildings on 9 August 1956, have echoed through South African history as a rallying cry for women's resilience, courage, and unwavering determination. Nearly seven decades later, that same spirit of defiance and solidarity lives on in the work of the Women in Physics in South Africa (WiPiSA) –a dedicated forum within the South African Institute of Physics (SAIP) that is breaking down barriers and building a future where women in physics can stand tall, unshaken.



Dr Katekani Shingange: Leading the Charge

At the helm of WiPiSA is Dr Katekani Shingange, a physicist whose journey embodies the very principles the forum champions. Hailing from Gavaza village outside Tzaneen in Limpopo, Dr Shingange obtained her PhD in Physics from the University of the Free State in 2020. Her research focuses on surface science, particularly powders and thin films of optoelectronic semiconducting metal oxides applied to gas sensing technology.

Prof. Rebecca Mhlongo, as one WiPiSA keynote speakers noted, the widespread implementation of universal programs to spark interest in physics-related careers has contributed to an increase in the number of women pursuing STEM-related disciplines in higher education. Narrowing it down to physical sciences presents an even bigger challenge given the intricacy and numerous challenges associated with the subject's broad classification.

A Response to a Persistent Challenge

WiPiSA was established in 2005 under the SAIP, in response to the barriers faced by women in science, particularly in physics. For two decades, the forum has worked to empower women in physics, nurture future leaders, and create opportunities for collaboration, mentorship, and advocacy across South Africa and beyond. Its mission is clear: to encourage girls and women to study physics, to support women to work in physics-related careers, and to assist in removing or overcoming the obstacles and barriers they face.



Dr Shingange serves as the chairperson of WiPiSA, championing the cause of women in physics and advocating for increased female participation in physics-related careers. Her dedication to knowledge transfer and skill development has positioned her as a leading figure in her field. In 2023, she was recognised as one of the 200 Mail & Guardian Young South Africans in the Technology and Innovation category, and she had the prestigious opportunity to attend the Lindau Laureates Meeting in 2019, where young scientists from across the globe gather with Nobel laureates.



Beyond her research, Dr Shingange actively engages in science communication workshops, mentors and supervises postgraduate students and junior researchers, and participates in initiatives like job shadowing for high school learners. Her commitment to empowering women in STEM is further highlighted by her involvement in various activities aimed at attracting and nurturing female talent in the field.

A Year of Impactful Activities

2025 marked a momentous milestone for WiPiSA as the forum celebrated 20 years of impact, advocacy, and transformation. At the 69th Annual SAIP Conference, WiPiSA hosted a special panel discussion reflecting on the strides made in advancing gender equity in physics, sharing inspiring stories, and exploring the road ahead. A commemorative portrait was captured, honouring the trailblazers, mentors, and emerging voices who continue to shape the future of physics through representation, resilience, and excellence.



The celebration continued into 2026 with a packed calendar of activities. On 22 August 2026, the Heidelberg Academy of Science hosted its first WiPiSA Departmental Lunch at Sithokomele Primary School in Ratanda, Heidelberg. The event drew 29 participants, learners, tutors, women physicists from the University of the Witwatersrand, Mintek, iThemba LABS, and the University of Limpopo, as well as community members.

Webinars, Mentorship, and Capacity Building

WiPiSA's webinar series, an integral part of its mentorship programme, has covered diverse topics ranging from taxation and funding opportunities at the CSIR to research mentorship, featuring expert speakers and attracting significant participation. During Women's Month, WiPiSA introduced initiatives like Physics and I, celebrating women with a background in physics and exploring how physics has influenced their professions and Woman to Woman, focusing on women-to-women supervision and mentorship in science and research fields. The forum also sponsored four departmental lunches and organised a mentorship event to explore the impact of mentorship on career advancement.



For International Women's Day 2025, WiPiSA hosted a webinar with partners from Kenya and Botswana titled Inspire Inclusion: A Global Dialogue on Mentorship and Empowering Women in Science, facilitated by Dr Shingange. The webinar explored how mentorship can support women in science, with panellists sharing personal experiences and highlighting the importance of tailored mentorship programmes that address systemic biases, work-life balance, and visibility.

The Spirit of 1956 Lives On

The ladies of 1956 understood that the fight for equality requires collective action, courage, and an unshakeable belief in one's own worth. As Dora Tamana declared to the women gathered at the Union Buildings: "We, women, will never carry these passes. This is something that touches my heart, I appeal to you women to come forward and fight" . And fight they did—with a song that became the credo of South African women: *"If you strike the woman, you strike a rock!"



Today, WiPiSA carries that same fighting spirit into the physics classrooms, laboratories, and conference halls of South Africa. Through mentorship, outreach, advocacy, and community-building, the forum is ensuring that the next generation of women physicists will not have to face the same barriers alone. They are proving that when women in physics stand together, they are indeed as unbreakable as rock.

As Dr Shingange and her team continue to champion the cause of women in physics, they are not just building careers, they are building a legacy. A legacy that honours the pioneers who came before, celebrates the achievements of today, and paves the way for a future where gender is no longer a barrier to reaching for the stars.

NSTF-SOUTH32 AWARDS 2025/2026

The NSTF-South32 Awards, known as South Africa's "Science Oscars", celebrate outstanding achievements in science, technology and engineering. The 2025 and 2026 awards highlighted how South African researchers and innovators are addressing major challenges while advancing the country's scientific future.

2025 – Quantum Science and Technology The 2025 awards, held on 31 July 2025, focused on the UN's International Year of Quantum Science and Technology. Key achievements included:

Prof Liza Korsten received the Lifetime Achievement Award for her work in food safety, plant health and food security.

Prof Andrew Forbes won the Quantum Science and Technology Award for developing South Africa's quantum research capacity and mentoring around 90 young researchers.

Prof Shahida Moosa was recognised for pioneering medical genetics, genomics and precision medicine in Africa.

Prof Yin-Zhe Ma received an award for groundbreaking research into the large-scale structure of the universe and missing baryonic matter.

Prof Anne Fitchett and the Vehicle Dynamics Group were recognised for engineering education and research that improves vehicle safety, comfort and efficiency.

Dr Jabu Mtsweni was honoured for strengthening South Africa's cybersecurity research, policy and capacity.

Dr Emmanuel Kweinor Tetteh and Dr Rachael Dangarembizi were recognised as emerging researchers for their contributions to environmental engineering and neuroinfectious disease research.



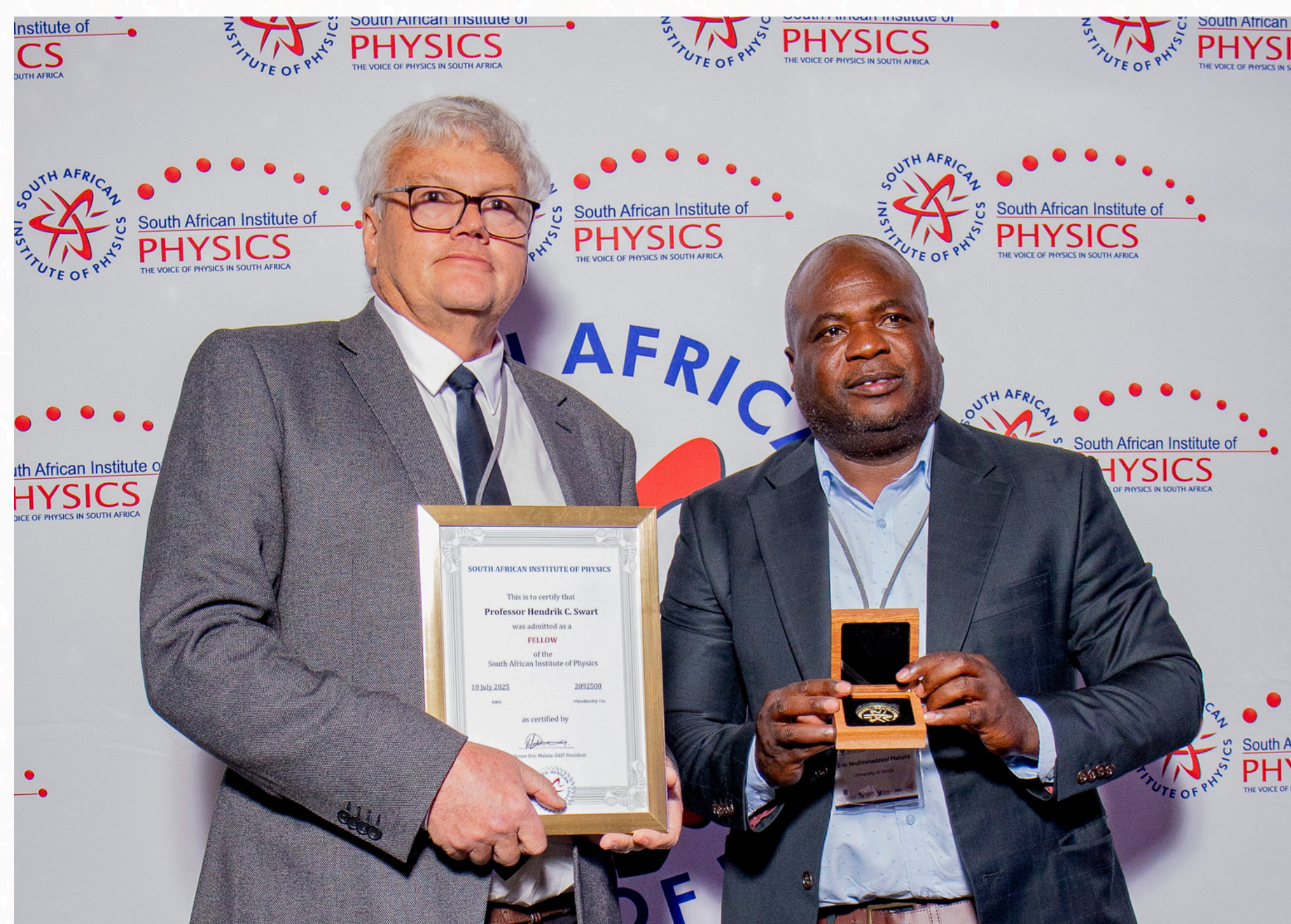
The SAIP in proud partnership with the National Science and Technology Forum (NSTF)-South 32 Awards, extends its warmest congratulations to all the 2026 award winners.

We salute your outstanding excellence, dedication, and groundbreaking achievements in academia and science. Your remarkable contributions continue to push the boundaries of knowledge, drive innovation, and inspire the next generation of scientists.

The South African Institute of Physics (SAIP) is the premier professional body representing physicists and advancing the discipline across South Africa. Guided by its core pillars of science, innovation, and impact, the institute fosters research excellence, facilitates collaboration, and hosts annual conferences to recognize outstanding contributions to the field.

SAIP Celebrates Excellence: 2026 Award Winners

The South African Institute of Physics (SAIP) celebrated outstanding achievements in physics during its 70th Annual Conference, held at the University of the Western Cape from 6–10 July 2026.



De Beers Gold Medal: Prof. Hendrik Swart (UFS) received SAIP's highest honour for more than four decades of influential research in luminescent and photonic materials, solid-state physics and materials characterisation. His career includes 1,000+ research publications and supervision of 120+ postgraduate students.

Student Excellence: Students played a major role at the conference, making up around 70% of delegates. North-West University won 7 of the 13 student awards in space science and astrophysics, highlighting the strength of its postgraduate research.



Future of Physics: Under the theme

“Physics in the Fourth Industrial Revolution towards a sustainable and inclusive future,” discussions highlighted physics’ role in areas such as climate change, renewable energy, quantum technologies and advanced materials.

Students played a major role at the 70th Annual SAIP conference, making up around 70% of delegates. Their overwhelming presence is a powerful testament to the vibrant, growing pipeline of scientific talent in South Africa. These young researchers are not just the attendees of today, they are the torchbearers of tomorrow.

SCIENCE IN THE HOME PUBLIC OUTREACH



The “Science in the Home” was a major community and learner engagement program hosted by the South African Institute of Physics (SAIP) during its 70th Annual SAIP Conference. The outreach initiative was designed to bring the wonders of physics directly into daily life by showing how everyday, recyclable household materials can be turned into fascinating science experiments.



TEACHERS WORKSHOP PRIZE GIVING



Mr Makondelele Netsianda, a Physics lecturer at the University of Limpopo, has been recognised as a silver award winner for his outstanding and sustained contribution to physics education in South Africa.

The honour celebrates a career spanning four decades, during which Netsianda has trained more than 2,000 teachers and enriched over 3,000 Physical science learners across all nine provinces. Mr Netsianda received the silver award recognising his legacy of excellence, service, and far reaching impact in Physics.

A Landmark Partnership for the Energy Sector

The 70th Annual Conference of the South African Institute of Physics (SAIP) proudly hosted an Industry Day in partnership with the South African National Petroleum Company (SANPC). This event marked a significant milestone in the newly established SAIP-SANPC Memorandum of Understanding (MoU), bringing together academia, industry, and government to explore the role of physics in the energy sector and the Just Energy Transition.

The event was held under the theme "Physics for the Energy Industry and the Just Energy Transition: Building Strategic Academia-Industry Partnerships for National Development," highlighting the importance of collaboration, innovation, and developing the skills needed to support South Africa's energy future.



The Role of Physics in the Energy Sector

A key objective of the Industry Day was to introduce the South African physics community to the opportunities, challenges, and career pathways across the energy sector. The event looked at the broader energy industry value chain, helping physicists better understand opportunities for impact across areas such as geophysics and exploration, subsurface imaging and modelling, infrastructure integrity and monitoring, materials science and corrosion, instrumentation and sensing, as well as data science and AI applications.

The engagement recognises two important realities: South Africa will continue to depend on petroleum and petrochemical systems for decades, even as the country transitions toward cleaner and more sustainable energy systems; and the Just Energy Transition requires strong scientific and physics-based contributions to ensure that the transition is evidence-based, economically viable, technologically feasible, and socially inclusive.

The event therefore aims to position physicists not merely as observers of industrial transformation, but as active contributors to solving real-world national challenges through research, innovation, and multidisciplinary collaboration.

The Just Energy Transition and Skills Development

The Just Energy Transition (JET) is reshaping South Africa's economic and labour market landscape, generating new demands for technical skills across disciplines including physics, engineering, and chemistry. As the country moves toward a more sustainable energy future, there is a growing need for a workforce equipped with the scientific and technical expertise required to support this transition.

The Industry Day sought to strengthen awareness of career pathways for physics graduates in the energy industry, while also exploring how academia-industry partnerships can contribute to improving STEM education and building stronger scientific talent pipelines for South Africa. This focus on skills development is critical, as the country's education and training system must be equipped to meet the demands of emerging technologies and ensure that South Africa can fully benefit from the opportunities presented by the energy transition.



The Role of SANPC in the Energy Transition

The South African National Petroleum Company (SANPC) was formed through the merger of the South African Gas Development Company (iGas), the Strategic Fuel Fund (SFF), and PETROSA, enabling the company to participate in the entire petroleum sector value chain and become an energy champion to ensure security of energy supply.

The company is tasked with reviving idle refineries, consolidating state petroleum assets, and reducing dependence on imports. SANPC is positioned to participate in upstream petroleum through holding state participation in petroleum rights, midstream through refining, and downstream sectors, including diversifying its energy sources through renewable energy, which in turn supports the Just Energy Transition. The company has made a significant commitment of R10 billion to integrate renewable energy into its portfolio.



SAIP Strengthens Ties with Government Science Stakeholders



The South African Institute of Physics (SAIP) recently hosted a productive engagement with key government science stakeholders in Pretoria, reinforcing its commitment to evidence-based policy, strategic partnerships, and the advancement of physics and related sciences in South Africa.

The roundtable meeting brought together members of the SAIP Council and Executive staff with senior representatives from the Department of Science, Technology and Innovation (DSTI), the National Research Foundation (NRF), and other science entities. Discussions focused on strengthening collaboration, aligning priorities, and exploring ways to amplify the impact of physics research and innovation on national development.

Key topics included the role of physics in addressing national challenges, support for emerging researchers, infrastructure and capacity development, and opportunities for increased engagement between the physics community and government.

SAIP President, Prof. Eric Maluta, highlighted the importance of sustained dialogue and partnership. “Physics is central to innovation, technology, and a knowledge-based economy,” he said. “Through closer collaboration with government, we can ensure that the benefits of physics research translate into real-world impact for society.”

Government representatives welcomed the engagement and expressed support for continued collaboration with the SAIP. The meeting concluded with a shared commitment to formalise cooperation and develop joint initiatives that will strengthen South Africa’s scientific capability and global competitiveness.

IUPAP IN 2026: A YEAR OF GLOBAL PHYSICS COLLABORATION

The International Union of Pure and Applied Physics (IUPAP) is bringing the global physics community together through major conferences, research initiatives and international collaboration across fields ranging from particle physics to astrophysics and materials science.



A key event was ICHEP 2026, the world's leading particle-physics conference, held in Brazil from 30 July to 5 August 2026, where researchers shared major developments in particle physics, cosmology, astrophysics and accelerator science.

A major milestone for South Africa is ahead: SAIP, together with local institutions, will host the IUPAP General Assembly and International Conference on Physics in 2027. This will provide an important platform for South African researchers to showcase their work and strengthen international scientific partnerships.

Overall: IUPAP's 2026 programme highlights the global, collaborative nature of modern physics, connecting researchers across countries and disciplines to advance scientific knowledge and address global challenges.

Dr Mlungisi Cele: Physics, the Fourth Industrial Revolution and a Future for Everyone

At a conference themed “Physics and the Fourth Industrial Revolution: Towards a Sustainable and Inclusive Future,” Dr Mlungisi Cele, Director-General of South Africa’s Department of Science, Technology and Innovation (DSTI), did not hide his optimism. “I’m feeling good. I’m feeling important. I’m feeling inspired,” he said. “The future of physics, and of South Africa, is looking really bright, like a star.”

For Dr Cele, that brightness is not only about scientific discovery. It is about what physics can do for society. He believes the physics community is shifting from purely fundamental science towards research that addresses pressing challenges—sustainability, production, and the convergence of the physical and cyber worlds.

Physics and the 4IR

“The 4IR is really about how you bring together the convergence of the physical and cyber worlds,” he explained, pointing to artificial intelligence, augmented reality, robotics and other technologies. “Physics provides the foundation for some of those technological advances.”

That is why young people should not worry about studying physics. “We need them more in areas like AI, data analysis,” he said. Physics, he added, is moving from being “big science” to engaging with all-encompassing domains.



Inclusion and the digital economy

Dr Cele stressed that information knows no boundaries. South Africa has high cellphone penetration, and COVID-19 forced blended learning, making young people familiar with digital tools. Government's plan, he said, is to modernise the economy and ensure no one is left behind. He welcomed Google's planned investment and the vision of South Africa as a digital innovation hub. But he warned that South Africa cannot survive surrounded by poor neighbours. "We've got to build AI capabilities here... and work with universities in neighbouring states so that the digital divide does not further widen the gap."

From publications to patents

On research commercialisation, Dr Cele was candid. South Africa is a top research performer by publications, though it has lost leadership in Africa to Egypt. The challenge is translating publications into patents and market-ready products. He cited the Technology Innovation Agency (TIA), the National Intellectual Property Management Office (NIPMO), and Offices of Technology Transfer (OTTs) at universities. The Innovation Fund, a fund of funds with the PIC, aims to incentivise companies to exploit intellectual property. But more money is needed. "For every rand that we invest, we leverage at least ten rand," he said. "We need billions to be invested."



Learning from China

He pointed to China's long-term perspective, reviewed every five years but never changed. "They are very clear they want to become an innovation country. They are pumping in resources and remain true to the course."

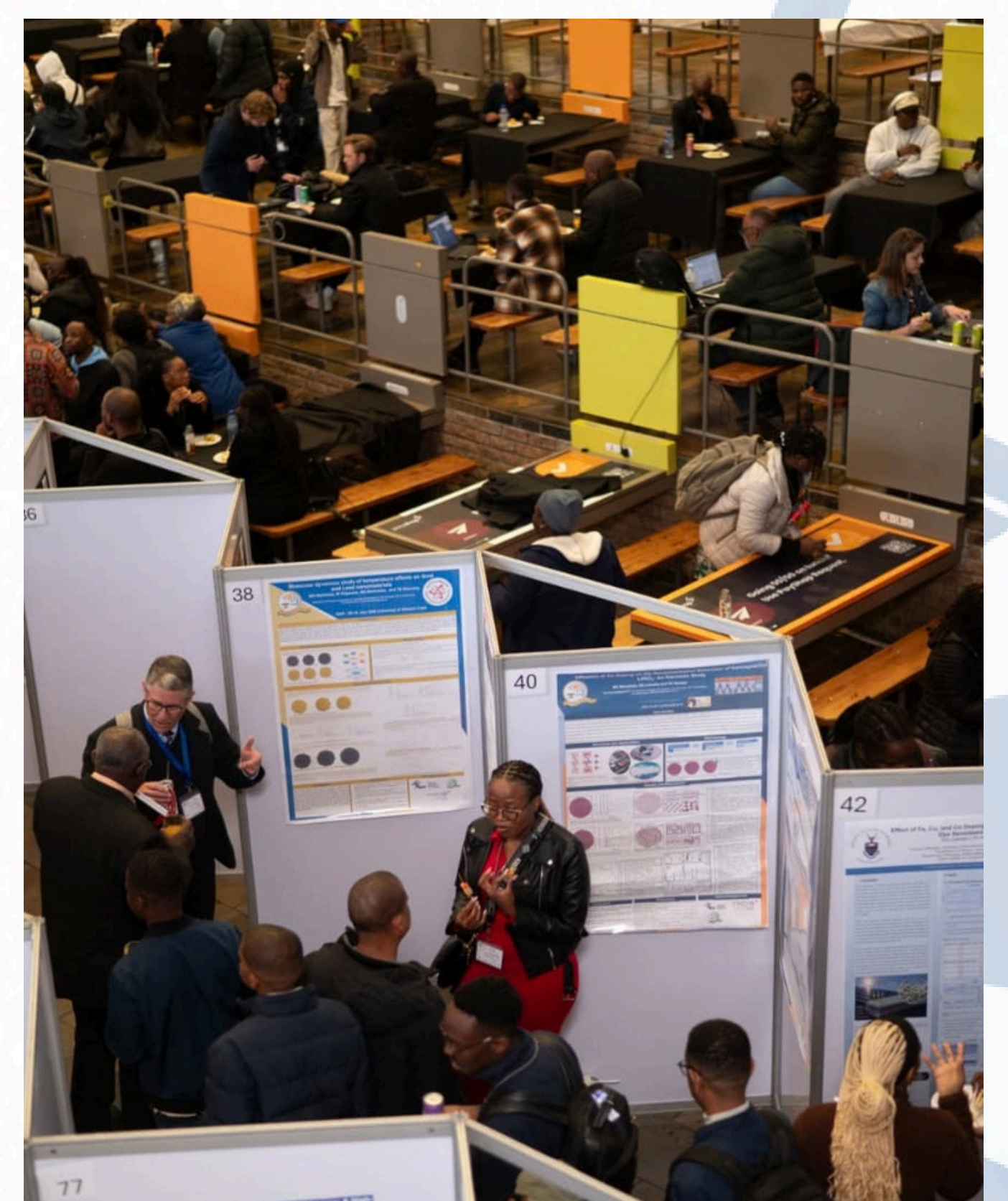
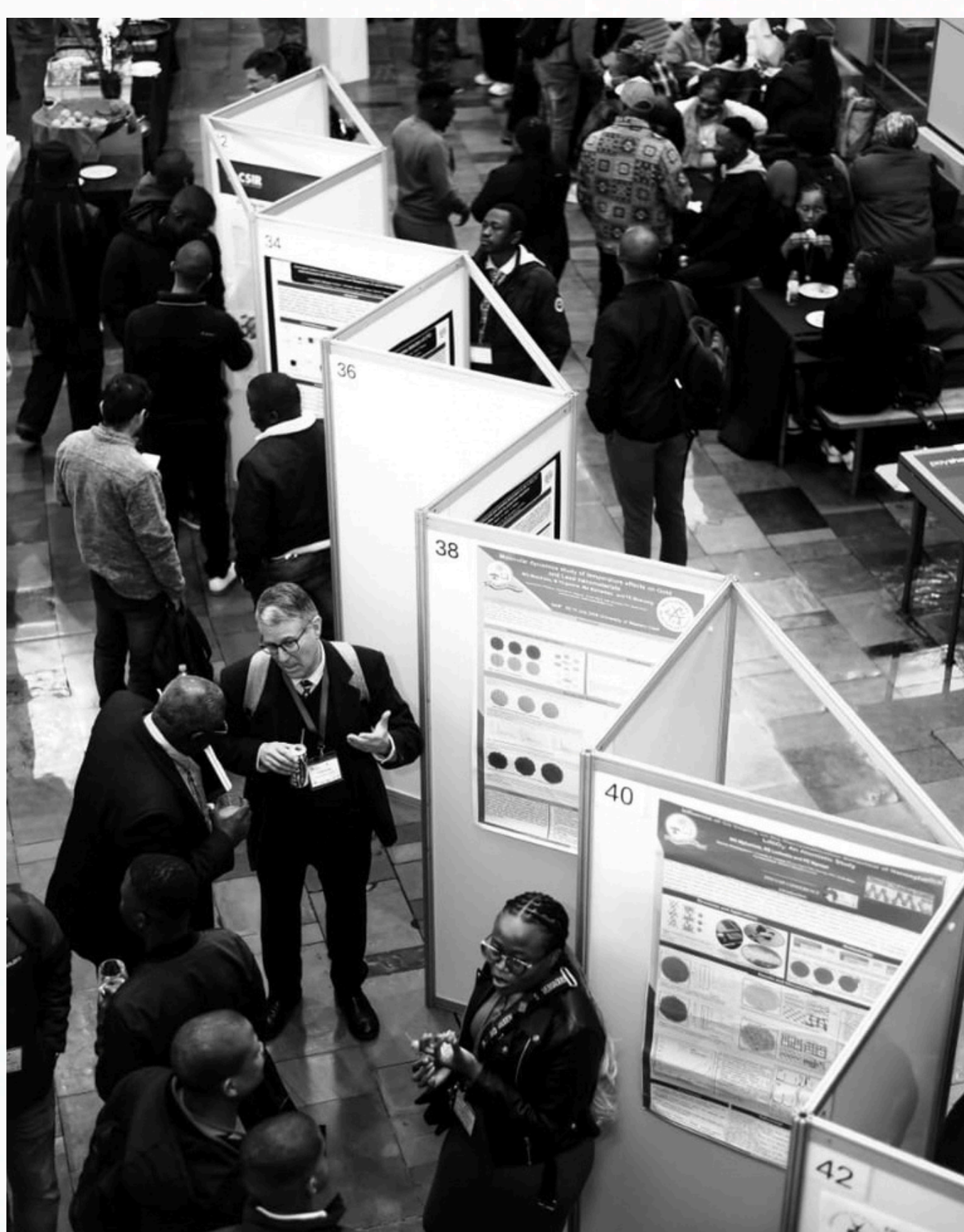
South Africa, he said, must set a long-term vision and stay the course. "You can't rush scientific initiatives; they take long by their very nature." If we persevere and invest, they can catalyse solutions to persistent challenges.



SAIP Poster Session Showcases the Future of Physics

The poster session at the recent South African Institute of Physics (SAIP) conference was buzzing with innovation as students from universities across South Africa gathered to showcase their research. The event served as a dynamic platform for emerging scientists to present work that is actively shaping the future of physics. From novel ideas to cutting-edge discoveries, the session highlighted the exceptional depth and creativity of the next generation of researchers. Every conversation and every question asked throughout the hall reflected the passion of these young physicists who are deeply committed to pushing the boundaries of knowledge.

The diverse range of posters and the enthusiastic engagement between presenters and attendees demonstrated a vibrant scientific community. These students are not only mastering complex concepts but are also applying their expertise to solve tomorrow's challenges. As the scientific landscape continues to evolve, the dedication displayed at this poster session underscores a promising future for physics in South Africa. By fostering an environment of inquiry and collaboration, the SAIP continues to empower the innovators who will drive national and global scientific progress in the years to come.





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EMPOWERING PEOPLE.
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