

Physics in my village, Physics in my community, city and township!



PHYSICS

**Improves Quality of Life
Makes the World Beautiful!**

PHYSICS is the branch of science concerned with the study of matter, energy, the universe and the fundamental laws that govern them

PHYSICS is about solving daily problems and understanding how the world works, and so physicists are brilliantly equipped to deal with all sorts of issues, from technological challenges, chaotic financial problems, to complex strategic planning

SPOT THE PHYSICS AT THE STUDENTS CENTRE MAKING THESE STUDENTS' LIFE



1. LCD screens on the wall, phones and laptop
2. Solar powered LED backup lights
3. Microprocessors and transistors in electronic gadgets
4. Accurate time via satellite
5. Battery technologies for phones, laptop and watch
6. Accurate measurement of weights of trade items such as chips, drinks and bread
7. Digital Camera Chips
8. Spectacles Optics
9. Eye sight corrected by Laser Surgery
10. Facial Cosmetics and Sunscreen from Nanomaterials
11. WiFi Radio Network to access internet
12. Novel paint design using Nano powders
13. Stain free clothes with nanoparticles
14. Material Physics for electronic devices casings

In the United Nations Millennium Summit held in 2000, it was recognised that physics plays a crucial role in attaining sustainable development. Physics helps maintain and develop stable economic growth since it offers new technological advances in feed into engineering, computer science, and even biomedical studies. UNESCO has declared 2022 as “**The International Year of Basic Sciences for Sustainable Development**” (IYBSSD 2022) <https://www.iybssd2022.org/>. SAIP plans to celebrate and communicate the immense contributions physics education and research have made to South Africa’s socio-economic development and how physics is vital in addressing the Sustainable Development Goals

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A CALL FOR CONTRIBUTIONS

Numerous activities are happening in South Africa that derive their success from physics. Therefore, the SAIP would like to hear how physics discoveries, research facilities, and education have improved life in your village, community, or township.

Physics affects us in diverse manners in our daily life and our communities. Think of the following!

- PHYSICS improves our health; (COVID19 Modelling, MRI, XRAY, CANCER Isotopes, Medical Physics etc.)
- PHYSICS connects the World; (Internet, Satellites, Fibre, Telephone, WiFi, Quantum Computing, etc.)
- PHYSICS brings High-Technology (Computers, Transistors and ICs, LCDs, Sensors for Automation, etc.)
- PHYSICS lights up our World (Nuclear Power, Solar Power, LED lights etc.)
- PHYSICS drives Big Science (CERN, Large Hadron Collider, SKA, LIGO)
- PHYSICS fills our Homes; (DVD players, Radios, Plasma TVs, Microwaves, Ovens, Video Games)
- PHYSICS keeps us Safe (Seismology & Earth Warning Systems, Weather-forecast, Military Radar Systems)
- PHYSICS moves us around the World (GPS Navigation Systems, Aerodynamics)

We, therefore, invite all interested parties to share their contributions on how physics improves our everyday life. **Think from simple daily activities like electricity provision, keeping your clock time correct, and the internet. Then consider how physics improves life in rural areas, like solar lighting, refrigeration, and water pumping. Next move to think of the current advanced research like biophysics helping with the COVID19 structure, etc.** Make contributions in the form of Contributions can be submitted in the following formats.

- 1) A ½ page written summary with illustrative pictures,
- 2) A Poster or Cartoon with illustrative pictures
- 3) A one 1-to 2-minute video clip, with relevant images and illustrations, or
- 4) Concept (1) or (2) embedded the video submission.

Submissions can be made in the following

Category	Description	Submission Type	Entry Level
1. How Physics Improves Quality of Life	General Aspects of how physics improves the quality of life in your community	<ul style="list-style-type: none"> • ½ Page Written Summary/short paragraph with pictures 	<ul style="list-style-type: none"> • School Learner, • Undergraduate, • Post Graduate, • General Public • Researcher/Academic
2. Advanced Physics Research Happening in South Africa	Summary of current research happening in South Africa and its potential impact to the quality of life/economic contribution	<ul style="list-style-type: none"> • Poster • Illustrative cartoons • 1-minute video clip 	

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Submission Deadline: 25 June 2021

All contributions must be submitted to the SAIP before the close of business on 25 June 2021.

Prizes for Contributions

Video clips submitters will be entered into a contest for the best video in each category. Submitters can enter as individuals or as a team.

First Prize: R3 000.00

First Runner-Up Prize: R2 000.00

Second Runner-Up Prize: R1 000.00

The public will be invited to vote for the best video in each category.

The final ranking will be decided by a judging panel, also taking into account the popular vote. The winners will be announced during the SAIP2021 annual conference during the closing ceremony on Friday 30 July 2021.

**ADDITIONAL EXAMPLES
ON PHYSICS IN SOUTH AFRICA**

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Through the **SAIP Weekly Webinar Series**, several presentations on how physics in South Africa is addressing socio-economic challenges and the Sustainable Development Goals were made, for example, the following.

1. **How blue skies research has created billions of Rands worth of impact for South Africa** (Prof Mike Kosch: SANSA)
2. **From the discovery of the Higgs boson to modelling COVID-19**(Prof Brice Mellado, Wits & iThembaLABS)
3. **SAIP Physics Teacher Development Project: Implications for Human Capital Development and Achievement of Sustainable Development Goals (SDGs)** (Speakers: Prof David Wolfe – IOP Africa Volunteer, Mr Vusi Mngomezulu – Allan Gray, Dr Sam Ramaila – University of Johannesburg, Dr Eric Maluta – University of Venda and Dr Derek Fish – University of Zululand Science Centre)

There are several other examples of physics research and discoveries happening in South Africa, for example, the following;

1. Advancement in Astronomy
 - Since 1820, the fortunes of astronomy in South Africa have waxed and waned. But today you don't need to look hard for signs of its ascendancy. One of them is a forest of radio dishes rising out of the dusty Karoo in the Northern Cape province, where 20 years ago you would have found only sheep. Those dishes belong to the MeerKAT radio telescope, an instrument that will form part of the giant Square Kilometre Array (SKA) radio telescope. The SKA will be the world's largest and most sensitive radio telescope, and it will address questions on galaxy formation, dark energy, and the primordial Universe. (source: <https://physics.aps.org/articles/v13/176?fbclid=IwAR0A400xOXkCbi6zd4FunqIUw3liWGE0j6fnD1wVENFz5Q412Q3KeeZCN8Q>)

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Figure 1: The Southern African Large Telescope is one of the four telescopes operated by the South African Astronomical Observatory (SAAO)

2. Growth in photonics research

- laser science, in 2013 Dr Sandile Ngcobo (the Council for Scientific and Industrial Research (CSIR) scientist) invented the world first Digital Laser

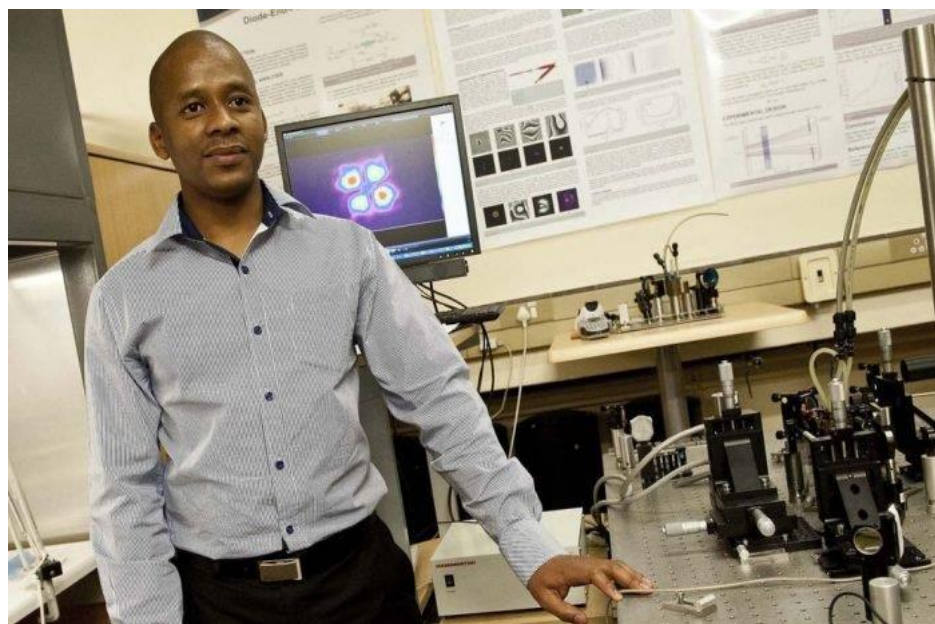


Figure 2: Dr. Sandile Ngcobo (Gallo Images).

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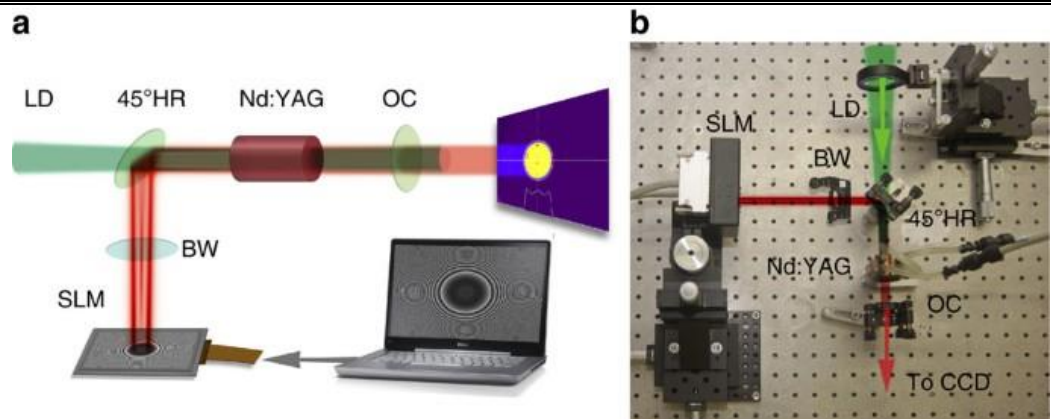


Figure 3: Concept and experimental realisation of the digital laser. (Source: <https://www.nature.com/articles/ncomms3289>)

3. Particle Physics and Big Data

- Several South African researchers were involved in the 2012 Higgs boson discovery. Several South African universities and one research institution are collaborating with the European Organisation for Nuclear Research (better known as CERN) in the SA-CERN programme and have been active participants in the search for the Higgs boson. They are the Universities of Cape Town, Johannesburg, Kwazulu-Natal, the Western Cape and the Witwatersrand, Rhodes University and the iThemba Laboratory for Accelerator-Based Science (iThemba LABS).

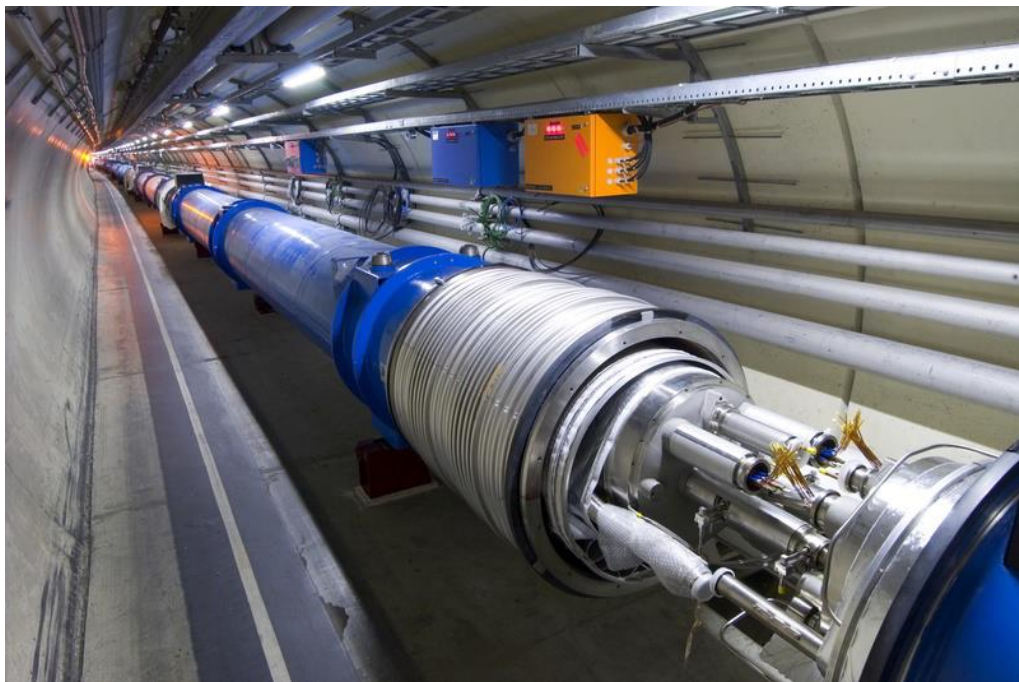


Figure 4: The Large Hadron Collider at CERN in Europe is the world's largest and most powerful particle accelerator.

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4. Innovations from physics

- During the pandemic, many scientists applied their skills to fight the virus. Bruce Mellado, a physicist at the University of the Witwatersrand and a senior scientist at iThemba LABS, helped develop a COVID-19 dashboard that feeds into the government's pandemic response.



Figure 5: Prof. Bruce Mellado (source: <https://www.nrf.ac.za/events/discovery-higgs-boson-modelling-covid-19-pandemic-role-ai>)

- The South African Radio Astronomy Observatory was put in charge of the National Ventilator Project, which manufactured noninvasive ventilators and distributed them to hospitals
- The Computed Axial Tomography Scan or CAT was developed by Cape Town physicist Allan Cormack and his associate Godfrey Hounsfield. He provided the mathematical technique for the CAT scan, in which an X-ray source and electronic detectors are rotated about the body and the resulting data is analysed by a computer to produce a sharp map of the tissues within a cross-section of the body. This resulted in a Nobel Prize in Physiology and Medicine.



Figure 6: CAT Scan