Basic Sciences for Sustainable Development

AN NSTF DISCUSSION FORUM

DAY 1: 26 October 2022

Speakers' Biographies

NSTF-South32 Award Winner: TW Kambule-NSTF Award: Researcher 2021

Keynote Speaker for Day 1

The importance of particle physics as the foundation of cutting-edge research and its implications.

Prof Bruce Mellado, is a Professor at the University of the Witwatersrand, a Senior Researcher of iThemba LABS, and serves as the Director of the Institute for Collider Particle Physics. He holds a PhD from Colombia University. He was the National Contact Physicist of South Africa at the ATLAS experiment at CERN and the Co-Chair of the Nuclear Particle and Radiation Division of South African Institute of Physics. Currently, he is the Chairperson of the Institutional Board of the Tile Calorimeter at the ATLAS experiment. He is the recipient of several awards and fellowships. Prof. Mellado is an internationally acclaimed, B1 rated researcher of the National Research Foundation (NRF).

Prof Mellado is an expert on the Higgs boson – a sub-atomic particle that is thought to give matter its mass – and was a leading participant in its discovery that was announced in 2012 and led to the Nobel Prize in Physics being awarded in 2013 to François Englert and Peter W. Higgs.

He is a member of the Gauteng Premier's COVID-19 Advisory Committee, where he leads work on predictions. He is also the Co-President of the Africa-Canada Artificial Intelligence Data Modelling Consortium. The project received grant awards by the IEEE and the IDRC, also includes partnerships with IBM and Amazon and it is widely covered in the press.

How do basic sciences contribute to innovative solutions for clean water and sanitation?

Dr Farai Dziike is a postdoctoral Fellow at Durban University of Technology focusing on academic innovation technology and entrepreneurship and materials chemistry research in waste-to-profit. He has broad research and innovation experience. His recent research project was on heterogeneous catalysis materials chemistry. The research work was projected in the Innovation Hub Gap Green Technology competition in 2019. The technology won third prize and it is currently being incubated as Ti-Teq under a spinoff company called Indoni Amanzi HydroTech Solutions SA.

In 2018, Dr Dziike did a research project in photoelectrochemistry. The project focused on research and innovation on layered semiconducting electrochemical materials previously used for fabrication of gas sensors, photovoltaics, fuel cells and dye sensitized solar cells (DSSC). The materials are currently being innovatively used to modify internal surfaces of brine solution transmission and distribution materials to counter savage material corrosion in desalination technologies.

He was a part of the Wits Entrepreneurial Research Challenge WERC Programme in 2019.For this project, Dr Dziike researched and innovated on Solar Nano-photocatalysis wastewater purification and treatment under the WERC programme 2019. Research project is currently competing in the finals of the GCIP 2020 South Africa.

Overall, he has developed technology for Ti-Teq photoelectrochemical reactor for the photocatalysis purification and treatment of wastewater. The technology is used to recycle wastewater by using a photocatalyst to degrade the dissolved organic contaminants in water. And he developed the Solar Thermal Desalination unit plant for the evaporation of saline water over an electrochemical coated thermal reactor surface. The technology is being prototyped for industrial application in desalination of seawater using solar energy. So far, he holds 4 innovation awards.

Prof Samson Mashele has served as Head of the Department, Dean of the Faculty, and is currently the Acting Deputy Vice-Chancellor: Research Innovation and Engagement at

 **How do basic sciences like botany contribute to human health?**	Central University of Technology (CUT). He is the erstwhile Director of the Drug Discovery Unit and has since been elevated to a Research Centre at the CUT. He has also served as the Co-Chair of the 4IR summit that was hosted in Bloemfontein in collaboration with the Free State Provincial Government. His quest to quench his academic thirst led him to the Medical University of South Africa (MEDUNSA) where he excelled in medical science and was given a scholarship sponsored by USAID to do part of his doctorate research at the University of Michigan (USA). He was also a visiting scholar at the University of Michigan. After many years of teaching in South Africa, he went overseas as a professor at a medical university. He used his South African perspective in Problem Based Learning in helping to integrate modules in medical science both vertically and horizontally. He is serving on the editorial boards of many international journals and as panel member in research foundations. He has won many awards as the best facilitator several times in South Africa and overseas. He has supervised many students and published extensively in high impact factor journals. His research interest is discovering novel anticancer drugs. He is collaborating with universities overseas, nationally, and international research institutes.
 **How do basic sciences contribute to solutions to adapt to and mitigate climate change**?	**Mr Mthokozisi Moyo** is a PhD candidate at the Global Change Institute and the School of Animal, Plants and Environmental Sciences at the University of the Witwatersrand. He is interested in many aspects of ecology but mainly how plants and animals respond to global change. Mr Moyo's current research focuses on describing spatial patterns and functional traits associated with rainfall seasonality in Africa.He is passionate about getting more young people, especially Africans involved in science. He has mentored high school learners as well as undergraduate students. Additionally, he is also interested in sharing science and making it accessible for people who are not scientists. Outside of research, he enjoys travelling and sport.