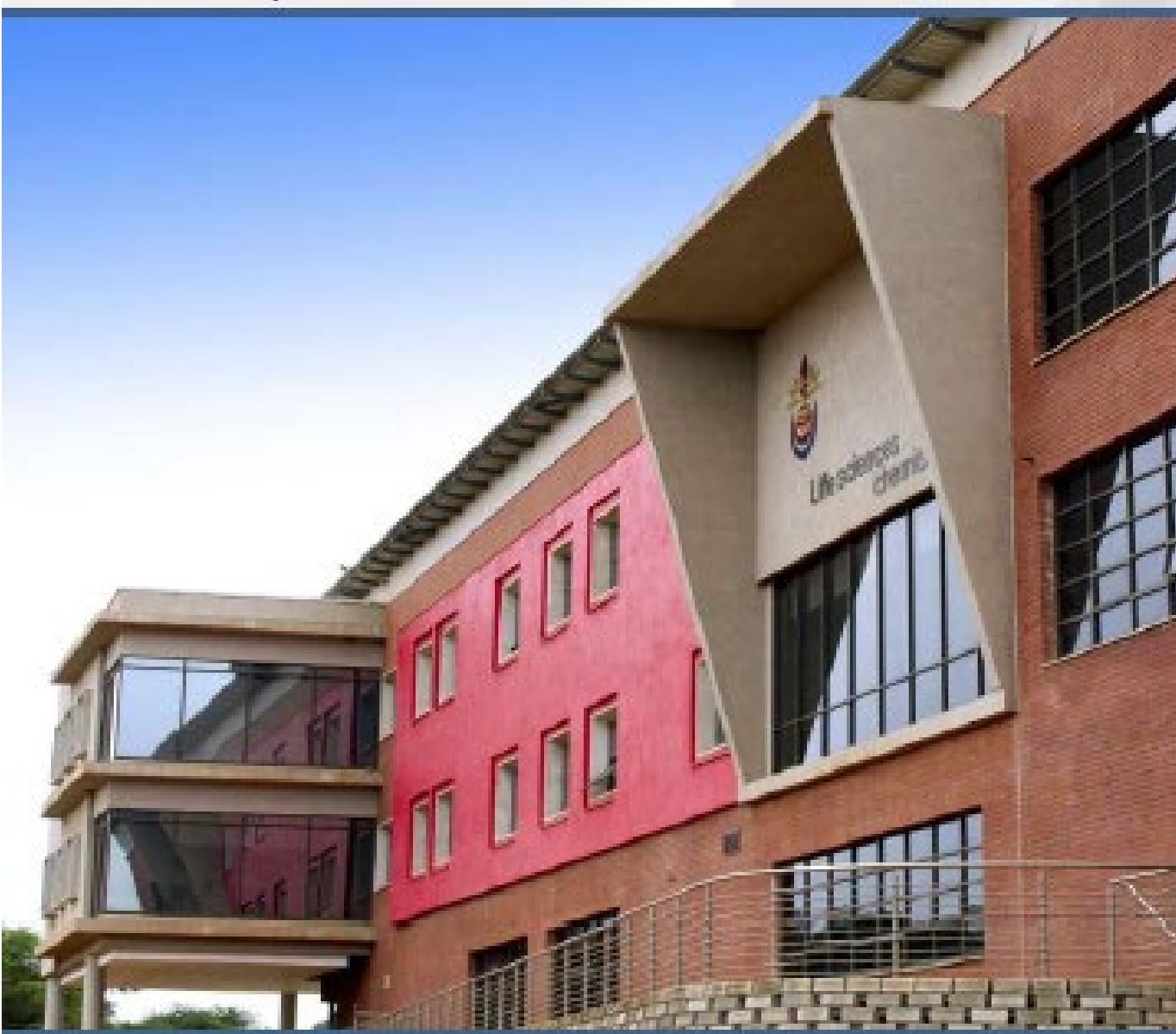


SAIP CONFERENCE PROCEEDINGS

Edited by: Prof. Makaiko Chithambo

2019

64TH ANNUAL CONFERENCE OF THE
SOUTH AFRICAN INSTITUTE OF PHYSICS



University of Venda
Creating Future Leaders

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Tel. +27 (0)12 841 2655 / 2627,
Fax +27 (0)86 648 8474,
E-mail info@saip.org.za.

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SAIP2019

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Edited By

Prof. Makaiko Chithambo

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Editorial

The picturesque The Ranch and the voluminous blue skies of Limpopo provided the backdrop for a memorable 64th in a series of annual conferences of the SAIP. Some papers from that meeting are collected in this peer-reviewed volume. Submissions for the proceedings of SAIP2019 were, for the first time, handled by an Editorial Board headed by an Editor-in-Chief and Associate Editors with responsibility for submissions in different subject tracks. Ideally, the period between submission and publication should be reasonably brief but the reality is far different. Publication of proceedings depends as much on the goodwill of reviewers as it does on the efficiency of editors. Evaluating papers is onerous and many of our reviewers made commendable efforts to produce proper reports for which we are grateful. Indeed, several reviewers read more than one paper. The Associate Editors spent much time on papers and reports to ensure that acceptable academic standards were met during peer-review for the proceedings to be credible. The cost of all this is a delay between submission and publication and a test of patience for many authors who otherwise usually expect a quick turn-around after submission. These proceedings have been produced in 2020, a year in which this country, as the world, has had to contend with COVID-19 and that is no small feat. We are extremely grateful to reviewers who gave up their valuable time to devote themselves to these proceedings and to all the authors for their patience as we toiled behind the scenes to produce these proceedings in good time despite the odds.

The SAIP was pleased to welcome Professor Deena Naidoo as its new president coming in to replace Patrick Woudt whose term of office had come to an end. The conference gratefully acknowledged the commitment and inspiration with which Prof Woudt has led the institute. The new president, Prof Naidoo, a condensed matter physicist, also serves as the Head of the School of Physics at the University of the Witwatersrand.

We received 87 papers. Of the number that was eventually reviewed, 68% were accepted for publication. On behalf of the Editorial Board, I thank all authors for submitting their work to SAIP2019 proceedings.

Makaiko Chithambo

Editor-in-Chief



Delegates to the 2019 South African Institute of Physics conference. What of the warrior in battle garb and stance on the far right? Unlike the statue of the Commendatore in Don Giovanni, the warrior never left his pedestal and remained a sculpture throughout the conference.

Message from The Conference Chair

The Department of Physics, University of Venda, was pleased to welcome delegates to the 64th South African Institute of Physics Annual Conference. The Department was overwhelmed with joy to be the host of this conference. To have hosted an SAIP conference is a piece of history we will always be proud of.

It was a journey for our department to organize this important event. Due to circumstances beyond our control, we chose the Ranch Protea Hotel in Polokwane as the venue for the conference. Our department focusses on computational physics, atmospheric physics, renewable energy and energy materials all which we hope will play a role in the future progress of humankind.

I would like to thank all participants, sponsors and the LOC members who made this event a success. Specifically, I would like to appreciate plenary speakers and delegates who enriched this conference through their presentations and discussions. At this conference, 90% of the plenary speakers were women. Special thanks go to the University of Venda and other organisations for their financial support for the conference.

I appreciate the finalization of the proceedings of the 64th SAIP annual conference. I would like to thank all delegates who sent their papers for publication, the reviewers and editors who were guided by Prof Makaiko Chithambo (Rhodes University Department of Physics).

*Dr. Eric Maluta
HoD Physics
University of Venda*

Conference, Divisions and Editorial Board details

SAIP2019 Conference Chairperson

Eric Maluta; Head, Department of Physics, University of Venda

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IP Matamba	TS Ravhengani
V Khomunala	TT Khedzi
TS Mulaudzi	L Jhamba
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Herman Uys, Stellenbosch University

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Astrophysics

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Aletta Prinsloo, University of Johannesburg

Physics of Condensed Matter and Materials

Charles Sheppard, University of Johannesburg

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Proceedings of SAIP2019

Editor-in-Chief

Makaiko Chithambo

Makaiko Chithambo is a Professor of Physics and Head of the Department of Physics at Rhodes University. He is an NRF B2 rated research physicist with research interests in Experimental Solid State Physics specialising in the study of point defects in insulators using time-resolved luminescence and other allied methods. Makaiko Chithambo is the author of An Introduction to Time-resolved Optically Stimulated Luminescence published by Morgan & Claypool Publishers and IOP(UK). He is currently the Deputy President of the SAIP.

Associate Editors

Ernest E van Dyk

Ernest van Dyk is Professor of Physics at Nelson Mandela University. In addition to teaching Physics, his research interests are in the field of Solar Energy, specialising in Photovoltaics. He leads the Photovoltaics Research Group (PVRG) in the Department of Physics and is also Director of the university spin-off company, PVinsight (Pty) Ltd.

W A Horowitz

W A Horowitz is an Associate Professor of Physics at the University of Cape Town and Associate Faculty at the African Institute of Mathematical Sciences. He is the Head of the Theory Pillar of the SA-CERN Collaboration and the Associates' Representative at the National Institute of Theoretical Physics. He's an expert in theoretical high-energy nuclear physics whose publications have over 3000 citations.

Charles Sheppard

Charles. J. Sheppard is an Associate Professor in the Department of Physics, University of Johannesburg. His research interests are in the magnetism of chromium-based alloys, thin films and nano-materials.

Iyabo Usman

Iyabo Tinuola Usman is an Associate Professor at the University of the Witwatersrand, Johannesburg. Her specialist field of research is Experimental Nuclear Physics.

Aletta Prinsloo

Aletta R.E. Prinsloo is a Professor of Physics at the University of Johannesburg. Her research interests are on magnetism of chromium-based alloys, thin films and nanomaterials.

Patrick Woudt

Patrick Woudt is a Professor in the Department of Astronomy, University of Cape Town. His research specialisations are on the physics of accretion onto white dwarfs in mass-transferring close binaries with particular focus on 1) the study of rapid oscillations in cataclysmic variables, 2) the study of ultracompact helium-transferring binaries, and 3) optical and radio transient surveys using MeerLICHT and MeerKAT, respectively. He is a member of the Council of the SAIP and its past President.

List of reviewers

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