

Welcome to the latest issue of the **NASSP** newsletter. The aim of this publication is to keep all our *colleagues and collaborators abreast of NASSP developments as well as creating a forum for commentary and discussion from individual nodes. Contributions, news and suggestions are most welcome, please forward these to NASSP-UKZN.*

This newsletter is prepared by NASSP-UKZN.

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NASSP Mission and Vision

To empower South African and foreign African students **to embark upon PhD studies in astrophysics and space science** by providing them with the necessary skills, knowledge and inspiration. By harnessing

national expertise and resources and taking advantage of global network, **NASSP is committed to produce graduates whose qualifications are internationally competitive and locally applicable.** The programme will promote diversity and transformation while growing the next generation of graduate astronomers and space scientists who can enter and contribute to the South African work force, where mathematical skills and a command of research methods will be advantageous.

To create human capacity in astronomy and space science, particularly in under-represented communities, and to build a cohort of scientists at the core of an international network of African astronomers, space scientists and citizens, who are bonded by the common experience of schooling, interlinked both professionally and personally and able to make a major contribution to the transformation of society.

(i). Eulogy of Professor A.D.M. Walker



It is with sadness that we mourn the passing of Professor ADM (David) Walker, one of our most distinguished scientists, who was a consummate all-round academic. He was Professor of Theoretical

Physics in the University of Natal, Durban from 1972 (and Senior Professor from 1989) until he retired in 2002. After retirement, he continued as an active researcher until the end, as Emeritus Professor and Senior Research Associate of the University. He died on 17

September, 2018, aged 80.

After graduating with a BSc (Hons) at Rhodes University in 1959, Walker lectured while completing his MSc in 1962. He was then awarded the Shell International Postgraduate Scholarship to St. John's College, Cambridge, enabling him to do research at the Cavendish Laboratory, which led to a PhD in 1966. After his return to Rhodes he was promoted to Senior Lecturer, before he moved to Durban.

Prof Walker was recognized internationally as a world leading space physicist. Much of his research centred on ultra low frequency waves in the electrically charged particle environment (plasma) of the magnetosphere, the part of space that is affected by the earth's magnetic field. In addition to carrying out sophisticated theoretical (mathematical/computational) modelling, he also participated in the analysis and interpretation of both ground-based and satellite observations of the plasma behaviour. He was a co-initiator of and a Principal Investigator from 1993 to 2002 on the international SHARE (Southern Hemisphere Auroral Radar Experiment) project that involved dual radars at the South African Antarctic base, SANAE, and the British base (Halley Bay). As such he was also for many years a senior member of the international SuperDARN network of dual auroral radar experiments.

When the Foundation for Research Development (FRD), forerunner of the NRF, introduced rating based on international peer evaluation in 1984, David Walker was one of the first group of about a dozen scientists across all disciplines to earn an A-rating, that is, recognition as an international leader in his field. Despite various management roles, he retained his A-rating from 1984 through successive re-evaluations, to his retirement in 2002, after which it dropped to a B-rating (internationally acclaimed researcher).

Prof Walker received many accolades. He was a Fellow of the Institute of Physics (London) (1976-85) and of the Royal Society of SA (1988 --), and a Founder Member of the Academy of Science of SA (ASSAf) (1994 --). When the University of Natal introduced Fellowship in 1989, Walker was one of the first group of Fellows to be elected. In 1998, the SA Institute of Physics awarded him its highest honour, the SAIP de Beers Gold Medal, for outstanding achievements in Physics, and he was elected a Fellow of SAIP. Naturally, he played a very active role in a variety of national committees for space physics and Antarctic research. Amongst others, he served on the International Review Panel for the SA National Space Agency in 2012, and was a Board member of the new agency in 2013-14.

Internationally, his research and his views were highly regarded. On a sabbatical leave at the Max Planck Institut für Aeronomie in Lindau-Katlenburg, Germany, in 1977-8, he held an Alexander von Humboldt Research Fellowship. Other sabbatical and research visits included a year at Cambridge University (1969-70), three visits of 3-9 months at the Johns Hopkins University, Maryland, USA (1980- 1, 1984-5, 1991) and a 3-month stint at the British Antarctic Survey in Cambridge (1997). In addition, he was invited to present a six-week long series of postgraduate lectures as a Guest Professor at the Centre for Plasma Astrophysics of the Katholieke Universiteit Leuven, Belgium.

Walker was Associate Editor of the prime journal, *Journal of Geophysical Research - Space Physics* (2000-2002) and served on the Editorial Advisory Board of *Planetary and Space Science* (1982-92).

His research leadership role was also recognized internationally, and *inter alia* he was Vice-President of the ICSU Scientific Committee for Antarctic Research (SCAR) in 1998-2002 and Chairman of the Solar

Terrestrial and Astrophysical Research Working Group of SCAR (1994-2000).

Dave Walker also took his teaching seriously. When he joined the University, he brought with him a fresh look at our teaching and had a significant impact, for instance, in the development of lecture demonstrations and in supporting teaching experiments. His lectures were of a very high standard and were known for their clarity, his depth of understanding of physics and his well-planned notes.

During his career, he served the University of Natal in a variety of management roles, including being Head of the Department of Physics (1975-91), Dean of the Faculty of Science (1991-95), Acting University Vice-Principal (for spells of 1-3 months in 1981, 1984 and 1988), part-time Pro-Vice Principal (Information Systems) in 1992-94, and Senate Representative on Council (1983-87), as well as a Trustee and even Chairman of the Board of Trustees of the Retirement Fund (1996-2000). He was also elected to each of the most important committees of Senate at some time in his career. After retiring he held part-time posts as Pro-Vice-Chancellor (Research) of UN (2003-04) and then Director of Special Programmes in the Research Office, University of KwaZulu-Natal (2005-06). During these periods he worked on numerous projects, including, for instance, the merging of the 3 independent and 16 branch libraries, and the setting up of a Research Ethics Guide and protocols.

Dave Walker published 85 internationally peer reviewed research articles, many of them single-authored, and his work has been cited more than 3000 times. The seminal 1979 paper on dual auroral radar studies is a classic and has been cited 260 times. His last 3 papers were published in 2016, but ongoing projects should lead to further articles. In addition, he had 79 papers at international and 56 papers at national

conferences. Unusually, for a physicist, he also wrote 2 major research books: *Plasma Waves in the Magnetosphere* (348 pages), published by Springer in 1993, and *Magnetohydrodynamic Waves in Geospace: The Theory of ULF Waves and their Interaction with Energetic Particles in the Solar-Terrestrial Environment* (550 pages), published by the Institute of Physics Press, Bristol, in 2004. He graduated 8 PhD and 9 MSc student and a final student submitted his Masters' thesis recently.

His academic leadership style was characterized by his friendliness, analytical, incisive mind, integrity and fairness, his ability to delegate and his decisiveness. As a retired colleague has written, "It was a pleasure to be a member of the Physics Department he led so superbly -- many happy memories!"

Dave Walker had a way with words. The numerous documents that he prepared in his management roles were extremely well written, well-documented, analytical, and to the point. He was also an excellent speaker, whether as a debater in Senate, or as an entertaining after-dinner speaker. He was extremely well-read, and that feature was invariably reflected in his writing and his speeches.

After completing his second research monograph, Walker embarked on serious historical research, scouring museums and archives, following the story of his forebears, who were 1820 Settlers. This led to a 492-page book entitled *Pawns in a Larger Game: Life on the Eastern Cape Frontier* in 2013. His other hobbies included gardening and water colour painting. At one stage he took up long distance running, and twice qualified for the Comrades Marathon, but to his regret did not finish.

During his Cambridge days, Dave met his wife, Carol Glencross, a Scottish statistician, and they married in 1967. Throughout his career she was a very supportive wife to him. They have 3 children in New York, Cape Town and

Glasgow, and 6 grandchildren.

Our sincere condolences go to Carol and the family at this sad time.

Eulogy compiled by Professor Manfred Hellberg

(ii). DISCnet Data Science School held by AIMS (Salma Khan).

The African Institute for Mathematical Sciences (AIMS) hosted a data science workshop in Muizenberg, Cape Town from the 13th to the 15th of June earlier this year.



The workshop was aimed at students in their masters and PhD who are involved in intensive research in the mathematical sciences field. The workshop focused on advanced python



programming, specifically in the areas of machine learning, Bayesian statistics and software carpentry.

Salma Khan, 1st year NASSP MSc student supervised by Dr Stephenson at UKZN, had applied and she was chosen to attend said workshop. These courses were lectured by Dr. Michelle Lochner from AIMS/SKA SA, Dr. Matt Hilton from UKZN and Dr. David Bacon from ICG Portsmouth. The lectures were intensive and insightful and tutorials were held which were thorough and interactive.

The AIMS programme accepts students from all over Africa for their honours and masters degrees in various fields of mathematical sciences. It also provides an enriched learning environment where students and lecturers can interact with each other on a 24 hour basis as they are accommodated directly above the teaching institute in the main building in Muizenberg. I met many students from various African countries as well as local students who are studying through the programme and those who were attending the workshop from various South African universities. It was a pleasant and educational experience as both the staff and students were very friendly and accommodating.

(iii). Summer School on Cosmology 2018 held in Italy (Elimboto Yohana).

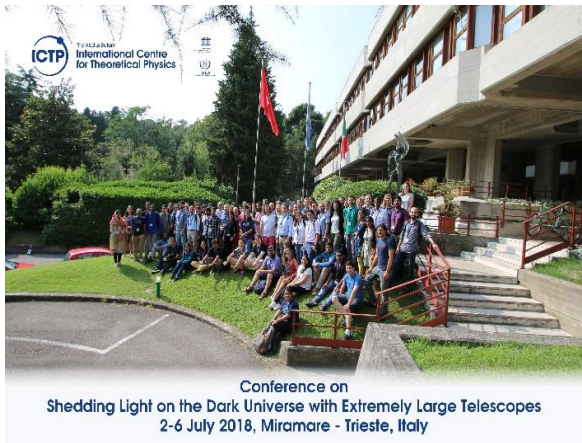
The purpose of the school was to provide an introduction to the current state of research in Cosmology and Astroparticle Physics. It was intended for beginning graduate students, as well



as more non-expert researchers that are interested in these fields. Elimboto Yohana (PhD student-Cosmology) was the only representative of South Africa from UKZN, attended the Summer School 2018 as from 18th -29th June 2018.

(iv). Conference on Shedding Light on the Dark Universe with Extremely Large Telescopes held in Italy (Elimboto Yohana).

This conference brought together an international group of experts to review the current state of the art in the study of dark energy matter and discussed how best to use giant telescopes to learn about their fundamental nature. It was the third of a series of three conferences.



Once again Elimboto Yohana (PhD student-Cosmology) was the only representative of South Africa from UKZN, attended the conference as from 2nd -6th July 2018, in Trieste, Italy.

Elimboto found that both Cosmology School and the conference were extremely beneficial to his studies and the future direction. He appreciates everything he has learned during this international trip. He is a member of



Astrophysics & Cosmology Research Unit (ACRU), part of the School of Mathematics, Statistics & Computer Science and the School of Chemistry & Physics (UKZN).

(v). ACRU Postdocs and PhD Student Experience in China (Ayodeji Ibitoye).



Some members of the Astrophysics and Cosmology Research Unit (ACRU) at UKZN have recently participated to a work trip to China. It is the destination where Dr. Anthony Walters, Dr. Di-Fu Shi, Dr. Denis Tramonte, Dr. Moumita

Aich, Mr. Ayodeji Ibitoye and Prof. YinZhe Ma spent approximately two weeks during last June. The reason of the visit was to fold. During the first week, the group attended two conferences in the Astronomy Town of Pingtang (Guizhou Province), namely the Pathfinders HI Science Coordination Committee meeting (PHISCC2018, June 11-13), and the FAST-MeerKAT and SKA Pathfinders Synergies meeting (RAF2018, June 13-15); during the second week, the group moved to the Chinese capital of Beijing to visit some local research institutes (NAOC, IHEP) in the framework of the South Africa – China Collaboration in Astronomy.

The talks presented at the two conferences provided an extensive coverage of many theoretical aspects related to the study of the neutral hydrogen 21cm emission at different scales, together with its correspondent implications for both astrophysical and cosmological research.

A detailed review of state-of-the-art observational facilities was also presented, along with the description of the current technical challenges and the strategies or data analysis tools proposed to tackle them. Most emphasis was given to the new generation of observatories, especially to the recently built FAST telescope and the upcoming SKA, also exploring the possible synergies between FAST and other SKA pathfinders. In this context Dr. Aich could present her recent research results on the cosmological implications from cross-correlation between 21cm and large-scale-structure survey data.

On June 24 the ACRU team eventually set off back to South Africa. ‘It has been an indescribable experience’ said Ayodeji, ‘This experience was a good fit for me as a researcher, enriched my knowledge and I also gained immensely from all the presentations’.



(vi). NASSP get-together function.

On the 24th August 2018, a promotional lecture geared towards recruiting new NASSP Honours students for 2019 took place. Prof Siva Venkataraman outlined the details of the NASSP Honours course as well as explaining the application procedure and bursaries available.



Promotional materials in the form of caps and flyers have been distributed by NASSP-UKZN to those attended the recruitment lecture on this day.

(vii). Machine Learning to revolutionize science in the African continent (Phumlani Phakathi).

Deep Learning Indaba (DLI) is an annual gathering of the African Artificial Intelligence community, which has been the biggest platform for the voiceless African continent on the basis of

understanding its continent current state in the fields of Machine Learning (ML) and Artificial Intelligence (AI).

On the 10th to 14th of September this year, more than 500 participants from 30 African and 19 international countries converged at Stellenbosch University for one of the largest AI and ML teaching events in the world.

The DLI was a week-long event of teaching, networking, policy debate, sharing around the state of the art in ML and AI, the catalyst for strengthening ML in Africa. Among the series of lectures conducted, a poster session was held where students from different fields shared their research work, even though some of the students like me presented on work unrelated to the field of AI. My poster title was on *Studying galaxy clusters with the Cosmic Microwave Background radiation using the Sunyaev-Zel'dovich effect*, which might have led me to being one of the recipient of the *AlphaGo*¹ DVD documentary about the team at DeepMind led by Dr David Silver, demonstrating the power of Reinforcement Learning.

Being part of such an event has been a pleasure and worthrepeating, and hopefully I will be part of the DLI2019 in Kenya.

(viii). Machine Learning to revolutionize science in the African continent (Phumlani Phakathi).



Mrs Thobekile Masondo and Ms Zanele Mtshali were part (as NASSP Exhibitors) of the Postgraduate Research & Innovation Symposium 2018 that was held at the University of KwaZulu-Natal (UKZN), Westville campus (T block) on the 25th of October 2018 by the College of Agriculture, Engineering and Science (CAES). This was the most amazing and knowledgeable day to the young researchers at the University. As the NASSP Exhibitors, this day was a success and most of the people have shown interest to join NASSP programme. We received a significant number of people that were interested in the programme, some of them asked questions which we have managed to answer. Some of them left their contact details for further information and update about the NASSP.

(ix). 2018 Young Scientist Award (Dr. Olakunle Ogunjobi).

In recognition of contributions of young scientists in innovative research in Space science area, the Chinese Geoscience Union (CGU) presented the 2018 Young Scientist Award to Dr Olakunle Ogunjobi for his work on “PMSE long term observations using SuperDARN SANA E HF radar measurements”.



He developed an algorithm for extracting PMSE (Polar Mesosphere Summer Echoes) event from SuperDARN (Super Dual Aurora Radar Network) while working on his PhD thesis. Dr. Olakunle Ogunjobi has now joined NASSP at UKZN as a postdoctoral researcher.

Contact us!!!

We look forward to receiving contributions and feedback from nodes and partners for our next newsletter.

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*Tentative date for next newsletter to be released
by 2019.*

