PROCEEDINGS OF SCIENCE

7^{th} Conference on High Energy Astrophysics in Southern Africa (HEASA2019)

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7th Annual Conference on High Energy Astrophysics in Southern Africa - HEASA2019
28 - 30 August 2019
Swakopmund, Namibia

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1. Foreword

HEASA 2019 was the seventh conference in the annual series *"High Energy Astrophysics in Southern Africa"*. Its goal was to bring together scientists from the southern African region, the African continent, and around the world with an interest in high-energy astrophysical phenomena. Topics discussed include theoretical, multi-wavelength, and multi-messenger observational aspects of astrophysical sources (e.g. active galactic nuclei (AGNs), galaxy systems, gamma-ray bursts (GRBs), X-ray/gamma-ray binaries, supernovae and supernova remnants, neutron stars, pulsars and pulsar wind nebulae, cataclysmic variables (CVs)) as well as modern aspects of astro-particle physics.

HEASA 2019 was hosted by the University of Namibia (UNAM), and took place next to the coast in the Auditorium of the Ministry of Fisheries and Marine Resources (Swakopmund), at the National Marine Aquarium, from August 28 to August 30, 2019. It was sponsored by the Department of Science and Technology (DST) and the National Research Foundation (NRF) of South Africa through the South African Gamma-Ray Astronomy Programme (SA-GAMMA) and the University of Namibia's Office of the Pro-Vice Chancellor Research, Innovation and Development.

Registration and abstract submission opened on May 1, with a deadline on August 4, 2019.

HEASA 2019, for the first time, allowed recent Ph.D. graduates to present their Ph.D. research in a *Dissertation Talk*, with extended time (20 minutes) compared to regular contributed talks. For HEASA 2019, Ph.D. graduates who completed their degree requirements after January 1, 2018, were eligible to present a Dissertation Talk.

All presentations are accessible online from
`https://fskbhe1.puk.ac.za/people/mboett/SAGAMMA/HEASA2019/HEASA2019.html`.

The deadline for submissions of proceedings papers passed in December 2019, after which the submitted papers have been subjected to an anonymous peer review process. The review process of all submitted papers was completed in December 2020, when the proceedings were published in the online journal Proceedings of Science (ISSN 1824-8039) at `https://pos.sissa.it/371/`.

Figure 1: Participants of the 7^{th} Conference on High Energy Astrophysics in Southern Africa (HEASA2019) in front of the National Marine Aquarium of the Ministry of Fisheries and Marine Resources in Swakopmund, Namibia.

2. Committees

2.1 Local Organizing Committee

- Dr Michael BACKES, *Chair – Department of Physics, University of Namibia, Windhoek, Namibia & Centre for Space Research, North-West University, Potchefstroom, South Africa*
- Lenté DREYER – *Centre for Space Research, North-West University, Potchefstroom, South Africa*
- Hambeleleni NDIYAVALA – *Department of Science Foundation, University of Namibia, Windhoek, Namibia*
- Jimmy N.S. SHAPOPI – *Department of Physics, University of Namibia, Windhoek, Namibia*
- Kleopas P. SHININGAYAMWE – *Department of Physics, University of Namibia, Windhoek, Namibia*

2.2 Scientific Organizing Committee

- Dr Michael BACKES, *Chair – Department of Physics, University of Namibia, Windhoek, Namibia & Centre for Space Research, North-West University, Potchefstroom, South Africa*
- Prof. Markus BÖTTCHER – *Centre for Space Research, North-West University, Potchefstroom, South Africa*
- Dr David BUCKLEY – *South African Astronomical Observatory, Cape Town, South Africa*
- Prof. Andrew CHEN – *School of Physics, University of the Witwatersrand, Johannesburg, South Africa*
- Prof. Petrus MEINTJES – *Department of Physics, University of the Free State, Bloemfontein South Africa*
- Prof. Soebur RAZZAQUE – *Centre for Astro-Particle Physics, University of Johannesburg, Johannesburg, South Africa*

3. Scientific Programme

3.1 Scientific Sessions

- Modelling I
  Chair: Prof. Markus BÖTTCHER – *North-West University, ZA*
- Modelling II
  Chair: Prof. Markus BÖTTCHER – *North-West University, ZA*
- Multi-Wavelength Astronomy
  Chair: Dr Michael BACKES – *University of Namibia, NAM & North-West University, ZA*
- Gamma-Ray Bursts and Supernovae
  Chair: Dr David BUCKLEY – *South African Astronomical Observatory, ZA*
- Active Galactic Nuclei I
  Chair: Prof. Garret COTTER – *University of Oxford, UK*
- Active Galactic Nuclei II
  Chair: Dr Eli K. KASAI – *University of Namibia, NAM*
- Large Magellanic Cloud
  Chair: Dr Eli K. KASAI – *University of Namibia, NAM*
- Community Engagement
  Chair: Prof. Soebur RAZZAQUE – *University of Johannesburg, ZA*

- Pulsars, Neutron Stars, and X-ray Binaries I
  Chair: Prof. Soebur RAZZAQUE – *University of Johannesburg, ZA*
- Pulsars, Neutron Stars, and X-ray Binaries II
  Chair: Dr Rhodri EVANS – *University of Namibia, NAM*
- Dark Matter and Fundamental Physics
  Chair: Prof. Hartmut WINKLER – *University of Johannesburg, ZA*
- Instruments
  Chair: Prof. Nukri KOMIN – *University of the Witwatersrand, ZA*
- Posters

3.2 Invited Speakers

- Prof. Matthew BARING – *Department of Physics and Astronomy, Rice University, Houston, TX, USA*: The Mysterious Magnetospheres of Magnetars
- Prof. Francesco COTI ZELATI – *Institute of Space Sciences (IEEC-CSIC), Universitat Autónoma de Barcelona, Barcelona, Spain*: Transitional millisecond pulsars
- Prof. Garret COTTER – *Department of Physics, University of Oxford, Oxford, UK*: Broad-band spectra and variability of AGN jets
- Prof. Roger DEANE – *Department of Physics, University of Pretoria, Prtetoria, South Africa*: Imaging black hole shadows with the Event Horizon Telescope
- Dr Rhodri EVANS – *Department of Physics, University of Namibia, Windhoek, Namibia*: The Africa Millimetre Telescope
- Prof. Herman L. MARSHALL – *Kavli Institute for Astrophysics and Space Research, Massachusetts Institute of Technology (MIT), Cambridge, MA, USA*: Prospects for X-ray Polarimetry
- Dr Foteini OIKONOMOU – *European Southern Observatory (ESO), Garching, Germany*: High-energy neutrinos from blazars flares
- Prof. Tsvi PIRAN – *Racah Institute of Physics, Hebrew University of Jerusalem, Jerusalem, Israel*: GRBs' Rosetta Stone – The Sub-TeV Emission Observed in GRB 190114c
- Dr Judith L. RACUSIN – *NASA Goddard Space Flight Center, Greenbelt, MD, USA*: Gamma-ray bursts and Gravitational Waves in the Fermi-LIGO/VIRGO era
- Prof. Patrick WOUDT – *Department of Astronomy, University of Cape Town, Cape Town, South Africa*: The ThunderKAT programme and synergies with MeerLICHT

3.3 Dissertation Talks

- Dr Hassan ABDALLA – *Centre for Space Research, North-West University, Potchefstroom, South Africa*: Extragalactic Background Light inhomogeneities and Lorentz-Invariance Violation in gamma-gamma absorption and Compton scattering
- Dr Natalia ZYWUCKA-HEJZNER – *Centre for Space Research, North-West University, Potchefstroom, South Africa / Nicolaus Copernicus Astronomical Observatory, Jagiellonian University, Krakow, Poland*: Morphological study of the TeV emission from 1ES 0414+009 and Centaurus A with the H.E.S.S. data

4. List of Reviewers

- Dr Michael BACKES – *Department of Physics, University of Namibia, Windhoek, Namibia & Centre for Space Research, North-West University, Potchefstroom, South Africa*
- Prof. Markus BÖTTCHER – *Centre for Space Research, North-West University, Potchefstroom, South Africa*
- Dr David BUCKLEY – *South African Astronomical Observatory, Cape Town, South Africa*
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- Dr Hannah DALGLEISH – *Department of Physics, University of Namibia, Windhoek, Namibia*
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- Prof. Soebur RAZZAQUE – *Centre for Astro-Particle Physics, University of Johannesburg, Johannesburg, South Africa*
- Dr Carlo VAN RENSBURG – *Department of Physics, University of Namibia, Windhoek, Namibia*
- Dr Briaan VAN SOELEN – *Department of Physics, University of the Free State, Bloemfontein South Africa*
- Prof. Christo VENTER – *Centre for Space Research, North-West University, Potchefstroom, South Africa*
- Prof. Hartmut WINKLER – *School of Physics, University of the Witwatersrand, Johannesburg, South Africa*