High Energy Astrophysics in Southern Africa 2014: A multi-frequency perspective of new frontiers in High Energy Astrophysics in Southern Africa

Boyden Observatory, April 24-25, 2014

Organizing Institutions

University of the Free State, Bloemfontein, South Africa
North-West University, Potchefstroom Campus, Potchefstroom, South Africa

Scientific Organizing Committee

M. Böttcher (North-West University),
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B. van Soelen (University of the Free State),

Local Organizing Committee

Markus Böttcher (North-West University),
Pieter J Meintjes (University of the Free State),
Brian van Soelen (University of the Free State),
Alida Odendaal (University of the Free State),
Hendrik (Pat) van Heerden (University of the Free State),
Jacques Maritz (University of the Free State),
Lizelke Klindt (University of the Free State),
Izak van der Westhuizen (University of the Free State),
Yolandie Loots (University of the Free State),
Karen Cronje (University of the Free State)

Dedication

The organizers of the *High Energy Astrophysics in Southern Africa 2014* meeting would like to dedicate this proceedings to Dr Michael Gaylard.

Mike was a driving force in radio astronomy and science in South Africa for over three decades. At this meeting in April 2014, Mike presented a talk on the *Opportunities for Radio Observations of Southern Sources* with an emphasis on high energy astronomy, where he once again displayed his excitement for astronomy, and its future, in South Africa and Africa. His passing, on the 14th of August 2014, is a terrible loss and he will be sorely missed.
Local Organizing Committee

With the passing of Mike Gaylard, South Africa has lost one of its great leaders in astronomy. Personally, my interactions with him have been few, but have left a lasting impression. I first met him shortly after my arrival in South Africa, in February 2013. The occasion was a conference to organize astronomy efforts in northern South Africa, for which he was the driving force, in spite of his already lingering illness at the time. At our last meeting at the HEASA 2014 conference in Bloemfontein, I was very delighted to hear that apparently his health had recovered. All the more shocking was the news of his untimely death only a few weeks later. He will be greatly missed in the South African astronomy community.
Markus Böttcher, Chair of SA-GAMMA

I first met Mike around 1989/1990 at the then Annual Review of South African Astronomy and Astrophysics meetings which we have back in those days. This was also the time when I discussed with Mike (and George Nicolson) the possibility of a radio astronomy project for our post-graduate students. Mike was always heavily involved in these projects and played a crucial role in these week long visits. It was also Mike who invited and convinced me to join him and Gordon MacLeod on the maser research. This led to a 22 year collaboration with Mike with many many memories of good times we had at HartRAO. We will continue with the maser work at HartRAO but will miss Mike very much.
Johan van der Walt, University of the North West

FOREWORD

This was the second *High Energy Astrophysics in Southern Africa* meeting organized by the SA-GAMMA consortium in South Africa. The aim of the meeting is to bring together South African and Southern African astronomers who are working in or have an interest in High Energy astronomy. The upcoming planned Cherenkov Telescope Array will be divided into a North and South station, and the current remaining short-list of candidate sites for the Southern station are Aar, Namibia and ESO, Chile. This is leading to a growth in gamma-ray astronomy in the country. Currently three South African institutes are members of the High Energy Stereoscopic System (H.E.S.S.) Collaboration, namely North-West University, the University of the Free State, and the University of the Witwatersrand.

This second meeting attracted a wide range of talks and subjects related to observational gamma-ray and multi-wavelength astronomy and interpretations and modelling of High Energy sources. This included talks on behalf of, or related to, H.E.S.S., SKA, SKA-South Africa/KAT-7, the *AGILE* Collaboration and the *Fermi* Collaborations. Participants came from a number of national institutes (including the University of Cape Town, North-West University, the University of the Free State, and the University of the Witwatersrand, the South African Astronomical Observatory, the Hartebeesthoek Radio Astronomy Observatory, SKA-South Africa/KAT-7) as well as international institutes (Space Science Division U.S. Naval Research Laboratory, Oxford University and the University of Nigeria).

This second meeting was held at the Boyden Observatory, located outside of Bloemfontein, South Africa. The Boyden Observatory was established at its current location in 1927, after being previously located in Peru. The Boyden Observatory was originally established as the southern station of the Harvard College Observatory, following a bequeath to Harvard College by Uriah A. Boyden. In 1955 the observatory became the first to be run by an international collaboration after the establishment of the Boyden Council. The original council consisted of representatives from Armagh Observatory, Northern Ireland; Dunsink Observatory, Eire; Royal Observatory, Uccle and Astronomical Institute, Belgium; Heidelberg, Hamburg and Würzburg, Germany; Sweden and Harvard College Observatory, USA. By 1978 the ownership of the observatory was taken over by the then University of the Orange Free State. Currently the main two science instruments on the observatory's site are the Boyden 1.5-m telescope, run by the UFS and the Watcher Robotic Telescope run by the University College of Dublin, in collaboration with the UFS. In addition, an extremely active public and school science programme is organized through the Boyden Observatory reaching approximately 10,000 people per year.

The organizers would like to thank all the participants for attending this conference and making it so successful. A special word of thanks to Dawie van Jaarsveldt for providing a tour of the Boyden Museum, to Mariette Erwee for the presentation at the Naval Hill Digital Planetarium, and Simon Rakotsoana, Yolandie Loots and Karen Cronje for their invaluable assistance.

The Editors: B. van Soelen and P.J. Meintjes

Front row: Bantipo Kamoua-Kolani, Pfesesani van Zyl, Brian Warner, Vanessa McBride, Tana Joseph, Markus Böttcher, Charles Dermer, Jacques Maritz, Takalani Enos Marubini, Soebur Razzaque. *Second row:* Brian van Soelen, Patrick Woudt, Rob Fender, Isak Delberth Davids, Eli Kasai, Andry Rajoelimanana, Itumeleng Monageng, Iurii Sushch , Christo Venter. *Third row:* Lee Townsend, Elizabeth Bartlett, Pieter Meintjes, Mike Gaylard, Izak van der Westhuizen, Lizelke Klindt, Alida Odendaal, Nadeem Oozeer. *Back:* Richard Britto, Richard Armstrong