

PREFACE • OPEN ACCESS

## High Energy Particle Physics Workshop (HEPPW2015)

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## Preface

The motivation for this workshop began with the discovery of the Higgs boson three years ago, and the realisation that many problems remain in particle physics, such as why there is more matter than anti-matter, better determining the still poorly measured parameters of the strong force, explaining possible sources for dark matter, naturalness etc. While the newly discovered Higgs boson seems to be compatible with the Standard Model, current experimental accuracy is far from providing a definitive statement with regards to the nature of this new particle. There is a lot of room for physics beyond the Standard Model to emerge in the exploration of the Higgs boson. Recent measurements in high-energy heavy ion collisions at the LHC have shed light on the complex dynamics that govern high-density quark-gluon interactions. An array of results from the ALICE collaboration have been highlighted in a recent issue of CERN courier. The physics program of high-energy heavy ion collisions promises to further unveil the intricacies of high-density quark-gluon plasma physics.

The great topicality of high energy physics research has also seen a rapid increase in the number of researchers in South Africa pursuing such studies, both experimentally through the ATLAS and ALICE colliders at CERN, and theoretically. Young researchers and graduate students largely populate these research groups, with little experience in presenting their work, and few support structures (to their knowledge) to share experiences with. Whilst many schools and workshops have sought to educate these students on the theories and tools they will need to pursue their research, few have provided them with a platform to present their work. As such, this workshop discussed the various projects being pursued by graduate students and young researchers in South Africa, enabling them to develop networks for future collaboration and discussion.

The workshop took place at the iThemba Laboratories - North facility, in Gauteng, from the 11<sup>th</sup> to the 13<sup>th</sup> of February 2015, where excellent conference facilities with outdoors and indoor tea areas for discussions and interactions were provided, along with a state-of-the-art remote access to the conference venue such that those who were unable to attend the workshop in person could also be present. The laboratory is located next door to the Wits Professional Development Hub (on the corner of Jan Smuts Avenue and Empire Road), which provided the catering for this workshop. A morning plenary session, followed 15+10 minute presentations, was the format across our three days. The topics covered being in high-energy theory and phenomenology (heavy ions, pp, ep, ee collisions), ATLAS physics and ALICE physics. The workshop website is <http://hep.wits.ac.za/HEPPW2015.php>

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**Figure 1.** *The opening address delivered by Zeblon Vilakazi.*



**Figure 2.** *The welcome delivered by John Carter.*