Contribution ID: **353** Type: **Oral Presentation**

mK-Scale Cooling of Nanoelectronic Devices in South Africa

Thursday, 6 July 2017 11:10 (20 minutes)

The Nanoelectronics Laboratory at the University of Cape Town has recently obtained the first sets of results from the new ultracold helium dilution fridge. First, the general working principles of the dilution fridge are discussed, including the mechanisms which enable the cooling of samples to temperatures of around 6mK. Following this, the first set of measurements in Africa of the Quantum Hall Effect (QHE) in a 2-Dimensional Electron Gas (2DEG) system are presented. The QHE is a fundamental measurement in the study of low-temperature condensed-matter systems, and is of particular importance in metrology as the basis for the international resistivity standard. The theory of 2DEG systems is also discussed, along with the relevance of experimental results in advancing the theoretical framework. Finally, preliminary results from and outlines for future experiments with more advanced nanoscale devices are presented and analyzed.

Summary

A discussion of the first results from the ultracold helium dilution fridge at the University of Cape Town, along with a contextualisation in terms of fridge mechanics, applications, and future projects.

Apply to be
 considered for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD, N/A)?

Hons

Main supervisor (name and email)
and his / her institution

Associate Professor Mark Blumenthal
mark.blumenthal@uct.ac.za
University of Cape Town

Would you like to <br> submit a short paper <br> for the Conference
 Proceedings (Yes / No)?

yes

Primary author: Mr WOLSKI, Samuel (University of Cape Town)

Co-author: Prof. BLUMENTHAL, Mark (University of Cape Town)

Presenter: Mr WOLSKI, Samuel (University of Cape Town)

Session Classification: Physics of Condensed Matter and Materials 1

Track Classification: Track A - Division for Physics of Condensed Matter and Materials