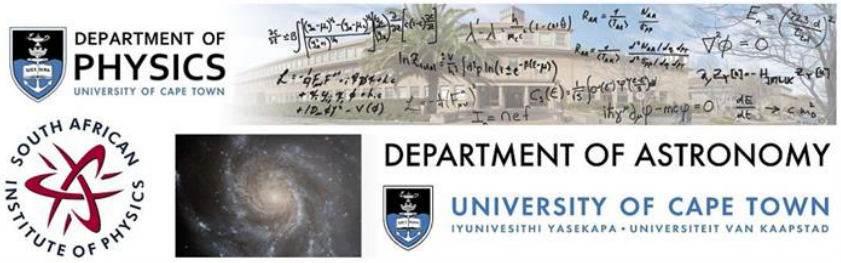

Contribution ID: **376** Type: **Oral Presentation**

Power Budget Analysis of Passive Components along an Optical Fibre Link of a Frequency Dissemination System within the MeerKAT Telescope Array

Tuesday, 5 July 2016 10:00 (20 minutes)

Abstract content
   (Max 300 words)
Formatting &
Special chars

The Square Kilometre Array (SKA) project aims to address the unsolved mysteries of fundamental astrophysics and physics. MeerKAT, the South African precursor to the SKA consisting of 64 interlinked receptors will be incorporated into SKA phase 1. A total of 170 km buried optical fibre will be used to aggregate large volumes of astrological data from each dish within the MeerKAT antenna array to the Karoo Array Processing Building (KAPB). The maximum length of fibre to be installed between the KAPB and an individual receptor is 12 km. Ultra high, precise time and frequency reference clock tones will be disseminated across the buried fibre to the digitizers located on each antenna, thereby providing phase coherence amongst the relevant MeerKAT telescopes. Temperature variations and external environmental conditions may have a detrimental effect on the phase stability of the optical signal transmitted along the fibre. This paper reports on a power budget analysis conducted of various passive components within the optical fibre link, of a phase noise compensation scheme using a vertical cavity surface emitting laser (VCSEL) actuating system. Furthermore, -18.1 dBm and -25.7 dBm were measured at the receiver side of the one way (12 km) and round trip (24 km) optical fibre transmission links respectively. PIN and APD photodiodes, with receiver sensitivities of -18 dBm and -25 dBm, were found to be suitable for optical detection along the one way and round trip links respectively. Using an APD receiver rules out the possibility of incorporating an erbium doped fibre amplifier (EDFA) into phase noise compensation scheme thereby reducing the cost and complexity of the system.

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

yes

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

PhD

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

Prof T.B. Gibbon
tim.gibbon@nmmu.ac.za
NMMU

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

No

Please indicate whether
this abstract may be
published online
(Yes / No)

Yes

Primary author: Mr WASSIN, Shukree (NMMU)

Co-authors: Prof. LEITCH, Andrew (NMMU); Mr BOIYO, Duncan (Centre for Broadband Communication, Nelson Mandela Metropolitan University); Mr ISOE, George (Centre for Broadband Communication,Nelson Mandela Metropolitan University); Dr GAMATHAM, Romeo Reginald Gunther (NRF, Square Kilometre Array South Africa); Dr GIBBON, Timothy (NMMU Physics Department)

Presenter: Mr WASSIN, Shukree (NMMU)

Session Classification: Applied Physics (1)

Track Classification: Track F - Applied Physics