



DEPARTMENT OF ASTRONOMY

UNIVERSITY OF CAPE TOWN  
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

Contribution ID: 5

Type: Poster Presentation

## Creation and detection of vector Bessel beams using digital axicons

Wednesday, 6 July 2016 16:10 (1h 50m)

**Abstract content** <br> &nbsp; (Max 300 words)<br><a href="http://events.saip.org.za/getFile.py/?target=\_blank">Formatting &<br>Special chars</a>

Bessel beams are optical fields that fall into the categories of non-diffracting beams. Vector Bessel beams have focal field distribution of cylindrical vector beams which has a high numerical aperture. These beams have found interesting applications in various facets of science ranging from biological optical trapping, optical communications and microscopy. In this work, Bessel beams are generated using digital axicons encoded into a spatial light modulator and converting the linearly polarized Bessel beams to circularly polarized vector Bessel beams. In addition, the orbital angular momentum modes in the beam were detected using modal decomposition. We further measured the degree of non-separability of the vector Bessel beams using state tomography quantum tool where we reconstructed the density matrix and calculated the concurrence and fidelity which explores the measure of vectorness of the beams. The results obtained are in agreement with literature.

**Apply to be**<br> **considered for a student** <br> &nbsp; **award (Yes / No)?**

Yes

**Level for award**<br>&nbsp;(Hons, MSc, <br> &nbsp; PhD, N/A)?

M.Sc

**Main supervisor (name and email)**<br>**and his / her institution**

Prof Golden Makaka  
gmakaka@ufh.ac.za  
University of Fort Hare  
Alice

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

Yes

**Please indicate whether**<br>**this abstract may be**<br>**published online**<br>**(Yes / No)**

Yes

**Primary authors:** Prof. FORBES, Andrew (University of Witwatersrand, Johannesburg); Mr IDISI, David Omofe (University of Fort Hare, Alice)

**Presenter:** Mr IDISI, David Omofe (University of Fort Hare, Alice)

**Session Classification:** Poster Session (2)

**Track Classification:** Track C - Photonics