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## Communication through fibres using cylindrical vector vortex modes.

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**Abstract content**   
 (Max 300 words)   
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Optical fibres have become, over the years, widely used in telecommunications because of their low loss and high bandwidth. In this study we explore ways in which to increase the bandwidth that are not currently used in fibre communication. Our work demonstrates that using the natural spatial modes of optical fibres, we can effectively encode and decode digital information. This is made possible by using the quantised orbital angular momentum (OAM) density of the fibre modes. The OAM density spans an infinite dimensional Hilbert space allowing, in theory, for an infinite amount of information to be communicated. We demonstrate the generation and detection of both scalar and vector vortex modes. These cylindrical vector vortex modes are close approximations to the natural fibre modes and exhibit non-separability between azimuthally symmetric polarisation and the spatial mode distribution. Further, we show that these modes are more robust in carrying information through fibres as they maintain their polarisation state and OAM density.

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

Yes

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

Msc

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

Andrew Forbes, andrew.forbes2@wits.ac.za, University of the Witwatersrand

**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 NDAGANO, Bienvenu (University of the Witwatersrand)

**Co-authors:** Prof. FORBES, Andrew (CSIR); Dr MCLAREN, Melanie (University of the Witwatersrand)

**Presenter:** Mr NDAGANO, Bienvenu (University of the Witwatersrand)

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