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## Digital detection of Bessel-Gauss beams

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**Abstract content** (Max 300 words) [http://events.saip.org.za/getFile.py/target=\\_blank](http://events.saip.org.za/getFile.py/target=_blank) **Formatting & Special chars**

High-order Bessel-Gauss beams (BG) are beams of helical wave front, described by their  $\ell$ -azimuthally varying phase and their radial wave vector  $kr$ . Bessel beams have been extensively studied due to their interesting properties, as they are known to be non-diffractive over a finite region, and their ability to self-reconstruct after encountering an obstruction. These beams carry orbital angular momentum of light of  $\ell \hbar$  per photon; as a result these modes can be used as a basis for encoding information. The tools to extract the azimuthal information carried by these beams have been introduced, but not much work has been done in the two-dimensional detection of these modes. We illustrate a new method for the two-dimensional detection of the BG modes of arbitrary radial and azimuthal mode indices using digital axicons. We also apply this tool to observe the radial and azimuthal spectrums of the self-reconstructing Bessel beam after encountering an obstruction, and also through optical turbulence.

Keywords: orbital angular momentum, two-dimensional detection, digital axicon

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

Yes

**Level for award (Hons, MSc, PhD)?**

MSc

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

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

No

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