

Laguerre–Gauss beams versus Bessel beams showdown: peer comparison

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Abstract

We present for the first time a comparison under similar circumstances between Laguerre–Gauss beams (LGBs) and Bessel beams (BB), and show that the former can be a better option for many applications in which BBs are currently used. By solving the Laguerre–Gauss differential equation in the asymptotic limit of a large radial index, we find the parameters to perform a peer comparison, showing that LGBs can propagate quasi-nondiffracting beams within the same region of space where the corresponding BBs do. We also demonstrate that LGBs, which have the property of self-healing, are more robust in the sense that they can propagate further than BBs under similar initial conditions.