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Intra-cavity generation of Bessel-like beams with longitudinally dependent cone angles

We report on two resonator systems for producing Bessel-like beams with longitudinally dependent cone angles (LDBLBs). Such beams have extended propagation distances as compared to conventional Bessel-Gauss beams, with a far field pattern that is also Bessel-like in structure (i.e. not an annular ring). The first resonator system is based on a lens doublet with spherical aberration, while the second resonator system makes use of intra-cavity axicons and lens. In both cases we show that the LDBLB is the lowest loss fundamental mode of the cavity, and show theoretically the extended propagation distance expected from such beams.

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