

Doughnut laser beam as an incoherent superposition of two petal beams

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Abstract

Laguerre–Gaussian beams with a nonzero azimuthal index are known to carry orbital angular momentum (OAM), and are routinely created external to laser cavities. The few reports of obtaining such beams from laser cavities suffer from inconclusive evidence of the real electromagnetic field. In this Letter we revisit this question and show that an observed doughnut beam from a laser cavity may not be a pure Laguerre–Gaussian azimuthal mode but can be an incoherent sum of petal modes, which do not carry OAM. We point out the requirements for future analysis of such fields from laser resonators.