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Superresolution beams

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The transformation of a Gaussian beam into a symmetrical TEM₀ Laguerre Gaussian beam (LGB) intensity distribution which has transverse superresolution properties is very useful in improving the spatial resolution of optical imaging microscopes by making the central diffractive spot smaller than the Airy spot. The beam shaping is achieved by using an annular binary Diffractive Optical Element (DOE) whose geometry is in connection with the location of the Laguerre polynomial zeros. The DOE imposes positions of p zeros of intensity distributions on the Gaussian beam, resulting to a generation of TEM₀ beams where there are minimum losses.

The LGBs are well-known family of exact orthogonal solutions of free-space paraxial wave equation in cylindrical coordinates. Theoretical and experimental results will be demonstrated for higher order TEM₀ modes of LGBs.

**Level (Hons, MSc,
 PhD, other)?**

PhD

**Consider for a student
 award (Yes / No)?**

Yes

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

NO

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