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Tesis: **"ENGINEERING OF FOCAL FIELDS USING VECTORIAL OPTICAL FIELDS"**

Resumen:

In this work is presented a revision of the main four theoretical methods employed for the generation of longitudinally polarized beams of light. Results obtained by numerical simulations using the method we consider the closest to our experimental capabilities are presented. The source employed has associated an unconventional polarization distribution corresponding to a radial polarization mode and although one can generate longitudinally polarized beams by focusing a radially polarized light source with an aplanatic lens of high numerical aperture, the strength of the longitudinal field component of these beams decreases rapidly outside their waist. Therefore, we also present by numerical simulations techniques to enhance the longitudinal field component of these beams, where different radially polarized light sources were impinged on an annular diffractive optical element of binary phase and then focused in a set-up of aplanatic high numerical aperture lenses, and depending on the characteristics of the light source, the geometry of the diffractive optical element, and the numerical aperture of the lenses, will be the beam dimensions and its intensity profile. Thus, we achieved to obtain a non-diffracting longitudinally polarized beam with FWHM=3.1λ, constant waist (0.88 λ) and a flat profile over most the covered intensity area. Additionally, we have proposed an experimental method to verify the existence of numerically simulated longitudinally polarized beams.