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Hybrid Gaussian Mode Formation Due to the Common Dielectric Mirror DAVID FOSTER, Deep Photonics Corp — Electromagnetic Gaussian modes in axially symmetric resonant cavities can be grouped into families indexed by the transverse order, N. In paraxial theory, all of the modes in each family are degenerate. In real cavities, however, the modes within a family have slightly different frequencies, with the frequency splitting scale being $O(\theta^2)$, where θ is the spread angle of the fundamental Gaussian mode. When the spectral width of a cavity is small enough to resolve this frequency splitting, the resulting cavity eigenmodes may be hybrid mixtures of Laguerre-Gauss (LG) modes. In a plano-concave cavity with conducting mirrors, all of the modes are LG modes. If the planar mirror is replaced with a dielectric mirror, the typical eigenmodes for $N > 1$ are hybrid quasi-TE and quasi-TM modes. These hybrid modes have unusual cross sections that are neither like LG modes or Hermite-Gauss modes. Hybrid modes cannot have well defined orbital angular momentum or spin angular momentum. We present a successful perturbation theory in θ^2 which predicts the properties of the hybrid modes based on the TE and TM reflection phases of the planar mirror.

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