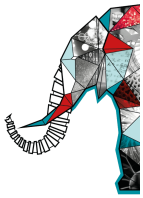
25e Congrès Général de la Société Française de Physique



ID de Contribution: **227** Type: **Poster**

Generation of very high-order and high-purity Gaussian modes

While lasers used for high-precision experiments typically generate an output beam in the fundamental TEM_{00} mode, higher-order Hermite-Gaussian ($HG_{l,m}$) or Laguerre-Gaussian ($LG_{p,q}$) modes can be beneficial for various applications. For instance, metrology experiments which use optical cavities or laser interferometers are fundamentally limited in their length sensing sensitivity by thermally-induced mirror surface motion. The effect of thermal noise can be mitigated by using a spatially broader intensity profile for the laser beam compared to the TEM_{00} mode. It has been predicted that mitigation of thermal noise can be achieved by higher-order modes and that the mitigation efficiency increases with the total mode order N (N = l + n for $HG_{l,m}$ and N = 2q + p for $LG_{p,q}$).
We experimentally demonstrate the conversion of the TEM_{00} laser mode at 1064nm to higher order HG modes of arbitrary order via a commercially available liquid crystal Spatial Light Modulator (SLM). We particularly studied the $G_{5,5}$/$HG_{10,10}$/$HG_{15,15}$ modes. A two-mirror plano-spherical cavity filter the higher-order modes spatially. We analyze the cleaned modes via a three-mirror diagnosis cavity and measure a mode purity of 96%/93%/78%. These modes are then converted into high-order LG modes which are also of particular interest in cold-atom physics.

Choix de session parallèle

1.4 Mesures de précision avec des peignes de fréquence optiques

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