Vector mode generator graphical user interface manual

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1 Overview

This software is a Matlab GUI to address the Holoeye Pluto spatial light modulator (SLM) in a split–screen configuration. The main goal is to provide an easy–to–use tool for the generation of cylindrical vector vortex beams as well as other instances of vector beams.

2 Requirements

The vector mode generator GUI software has the following requisites:

- Working Matlab station (2011 version and newer).
- Java virtual machine must be installed.
- The SLM must be plugged before running the software.
- Video card that supports a resolution of 1920×1080 pixels.

3 Interface

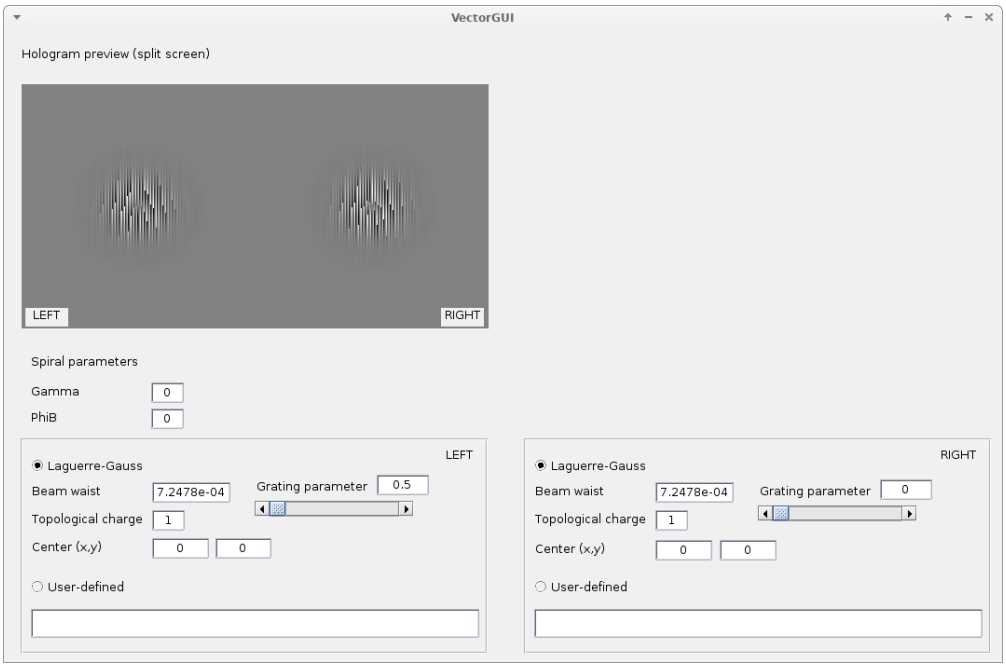

Figure 1: Screenshot of the GUI.

To run the GUI, execute the `VectorGUI.m` script inside Matlab. It will pop–up the interface as the one shown in Fig. 1. In the top–left corner of the GUI we show the displayed hologram in the SLM. As a default option, we use the Laguerre-Gaussian beams, where you can set the beam waist, topological charge and location of the beams for each half of the SLM. Indeed, we consider the components as

$$E_L = (\alpha - i\beta)\mathrm{LG}_{\ell_L}, \tag{1}$$

$$E_R = (\alpha + i\beta)\mathrm{LG}_{\ell_R}, \tag{2}$$

where $\alpha = \cos\gamma$, $\beta = \sin\gamma\exp(i\phi_B)$ and LG_ℓ is the Laguerre-Gaussian beam of zeroth radial order and topological charge ℓ, at the plane $z = 0$. To generate the well–known cylindrical vector beams we adjust the values of γ, ϕ_B, ℓ_L and ℓ_R as:

$$\text{Radial} \rightarrow \gamma = 0, \phi_B = 0, \ell_L = -1, \ell_R = 1, \tag{3}$$

$$\text{Azimuthal} \rightarrow \gamma = \pi/2, \phi_B = 0, \ell_L = -1, \ell_R = 1, \tag{4}$$

$$\text{Hybrid even} \rightarrow \gamma = 0, \phi_B = 0, \ell_L = 1, \ell_R = -1, \tag{5}$$

$$\text{Hybrid odd} \rightarrow \gamma = \pi/2, \phi_B = 0, \ell_L = 1, \ell_R = -1. \tag{6}$$

The grating parameter adjusts the grating over–imposed to the hologram. There is also the option to use custom functions in the user–defined section. For this option, the variables `X`, `Y` (capitals), are stored in memory for their use as the spatial coordinates. Each time you change a parameter in the GUI the hologram is refreshed in the SLM screen automatically.