

## Generation of a radially polarized Bessel-Gauss beam from *c*-cut Nd:YVO<sub>4</sub> laser

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A radially polarized beam exhibits distinct characteristics among the family of cylindrically polarized vector beams [1]. High numerical aperture focusing properties of a radially polarized beam are well known and offer wide range of applications like, laser scanning microscopy, particle acceleration, optical trapping and single molecular imaging [2]. Because of the nondiffracting nature, Bessel-Gauss beams offer properties, which are remarkably different from the fundamental Gaussian beam. Annular shaped intensity distribution and long depth of focus of Bessel-Gaussian beam provide many advantages in the field of biomedical imaging, material processing, optical trapping, and laser based particle acceleration. In the past, an axicon or diffractive mirror was used to generate scalar Bessel-Gaussian beam from the laser [3]. Direct generation of the radially polarized Bessel-Gaussian beam from a laser resonator has not been reported so far.

The purpose of the present study is to experimentally demonstrate the direct generation of a radially polarized Bessel-Gauss beam from a hemispherical laser cavity with a *c*-cut Nd:YVO<sub>4</sub> laser crystal. Figure 1 shows the experimental setup for the generation of a radially polarized Bessel-Gauss beam. Figure 2 shows the experimental results obtained from the laser. An annular shaped intensity distribution with radial polarization is obtained. Polarization distribution after a linear polarizer shows the generated beam is radially polarized. The present method offers many advantages like no-requirement of any special optical element for the polarization selection. The hemispherical laser cavity provides low sensitivity to misalignment and low diffraction loss.

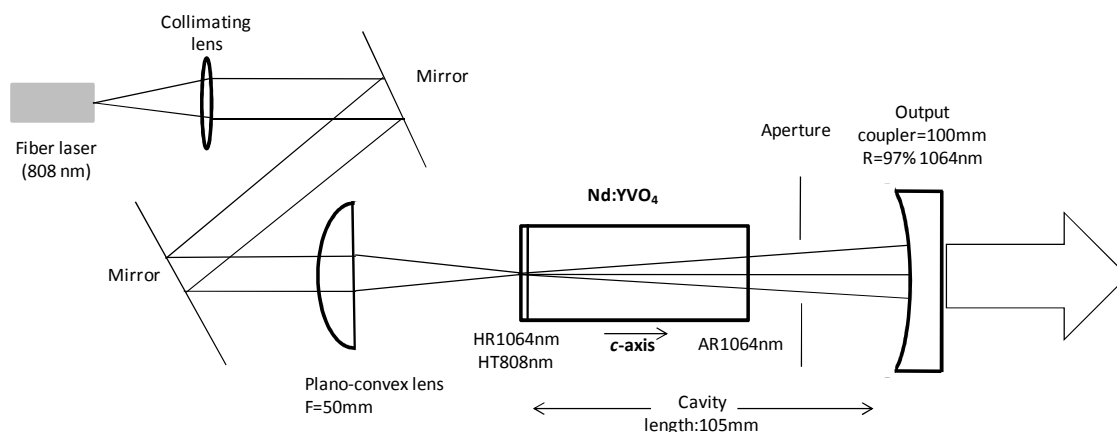


Fig.1. Schematic diagram of the *c*-cut Nd:YVO<sub>4</sub> laser.

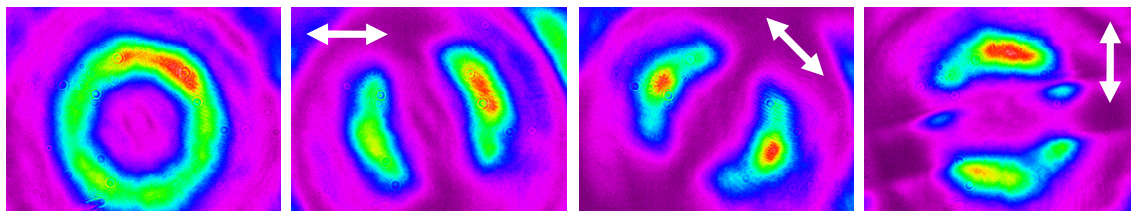


Fig. 2. Experimental results of a radially polarized Bessel-Gauss beam obtained from a *c*-cut Nd:YVO<sub>4</sub> laser cavity, (a) total intensity distribution, (b-d) intensity distributions after passing through a linear polarizer.

### References

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