Contribution ID: **145** Type: **Oral Presentation**

Azimuthal spectrum after parametric down-convertion with radial degrees of freedom

Thursday, 10 July 2014 14:40 (20 minutes)

Abstract content
   (Max 300 words)
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We investigated, theoretically and experimentally the radial degrees of freedom of the bi-photon states that are produced in spontaneous parametric down-conversion (SPDC) in the Laguerre-Gaussian (LG) basis. Theoretically we calculated the azimuthal Schmidt numbers for a range of radial indices combinations of the signal and idler beams and found that a larger azimuthal Schmidt number is obtained for higher radial indices. Moreover, larger azimuthal Schmidt numbers are also obtained when the difference between the two radial indices increases. Comparing these theoretical predictions with the azimuthal Schmidt numbers obtained from experimentally measurements, we found good agreement. Experimentally, we demonstrated that by using LG modes with slightly larger radial indices, it is possible to obtain a 3-fold increase in the azimuthal Schmidt number while maintaining a reasonable coincidence count rate by using.

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Main supervisor (name and email)
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Session Classification: Photonics

Track Classification: Track C - Photonics