



Contribution ID: 81

Type: Oral Presentation

## Orbital and spin angular momentum interaction in second harmonic generation

Thursday, 7 July 2022 11:30 (15 minutes)

Light can have spin angular momentum (SAM) and orbital angular momentum (OAM). While spin angular momentum is related to circular polarization and can only be either  $\hbar$  or  $-\hbar$ , OAM is related to the vortex phase structure and is equal to  $l\hbar$  where  $l$  is the number of screw dislocations in the phase profile (or topological charge). In paraxial wave optics these two physical properties are regarded as independent. In this work, we show that it is possible to combine these two quantities in the nonlinear regime. We exploit the non-collinear configuration of a type-II second harmonic generation to analyze all possible outputs of this process. We show that the generated beam has OAM equal to the sum of inputs OAM and SAM. This work unveils a novel type of interaction of degrees of freedom of light and we hope it can inspire discoveries of new types of light-matter interaction.

### Apply to be considered for a student ; award (Yes / No)?

No

### Level for award;(Hons, MSc, PhD, N/A)?

N/A

**Primary authors:** TAVARES BUONO, Wagner (University of the Witwatersrand); Dr DA SILVA, Braian Pinheiro (University of Dundee)

**Co-authors:** Prof. SCHNEIDER TASCA, Daniel (Federal Fluminense University); Dr JUSTINO PEREIRA, Leonardo (Federal Fluminense University); Prof. DECHOUN, Khaled (Federal Fluminense University); Prof. ZELLAQUETT KHOURY, Antonio (Federal Fluminense University)

**Presenter:** TAVARES BUONO, Wagner (University of the Witwatersrand)

**Session Classification:** Photonics

**Track Classification:** Track C - Photonics