Contribution ID: **323** Type: **Oral Presentation**

Uncovering the spatial distribution of entanglement using vectorial light

Tuesday, 4 July 2023 14:40 (20 minutes)

Vectorial light has long been established as a robust analogy for 2-dimensional quantum systems. Consequently, many of the insights and techniques from quantum mechanics, and entanglement in particular, have found significant applications in helping us understand and quantify many properties of vectorial light. This relationship also allows us to probe the nature of quantum systems using vector modes. Traditionally the degree of entanglement of a quantum state is thought of as a single value between 0 and 1. In this work we use the non-separability of vectorial light as an analogy for the degree of quantum entanglement and show that this value does not just vary between 0 and 1, but also changes depending on where in the state one chooses to look. Thus entanglement is not just a global property of the system, but varies spatially across the entire state. The results of this have applications in the fields of quantum imaging and allow for more detailed investigations of how entanglement evolves in complex quantum systems.

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

Yes

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

MSc

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Session Classification: Photonics

Track Classification: Track C - Photonics