Contribution ID: **104** Type: **Oral Presentation**

Temporal two-photon interference of entangled photons generated using partially coherent pump beam

Friday, 7 July 2017 11:10 (20 minutes)

Two-photon interference effects of entangled photons produced by spontaneous parametric down-conversion (SPDC) received a lot of attention in the last few decades. Various kinds of two-photon interference effects such as Hong-Ou-Mandel (HOM) effect, two-photon fringes in a Franson interferometer, induced coherence without induced emission, frustrated two-photon creation, and postponed compensation has been observed by different groups [1-3]. Previous studies have considered the pump beam as spatially coherent. It has been proven that in many applications a partially coherent beam is more robust than the fully coherent one. Recently, Jha and Boyd showed theoretically that the spatial coherence properties of the pump beam are entirely transferred to the coherence properties of the down-converted fields [4]. Of late it has been shown that the detection probability of the entangled two-photon field is higher and less susceptible to change in the properties of the environment if the field is produced by a lower mode of partially coherent pump beam [5].

Here, we present the results of our experimental work on temporal two-photon interference by considering pump beam as partially spatially coherent. For this, we used HOM-like interferometer which is based on the mixing of signal and idler photons. HOM-like effects can be understood as observations of how the degree of two-photon coherence changes as a function of the biphoton path-asymmetry-length difference.

References:
[1] C. K. Hong, Z. Y. Ou, and L. Mandel, Phys. Rev. Lett. 59, 2044 (1987).
[2] P. G. Kwiat, A. M. Steinberg, and R. Y. Chiao, Phys. Rev. A 47, R2472 (1993).
[3] T. B. Pittman et al., Phys. Rev. Lett. 77, 1917 (1996).
[4] A K Jha and R. W. Boyd, Phys. Rev. A, 81, 013828 (2010).
[5] Y. Qiu and W. She, Appl Phys B 108:683–687 (2012).

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

No

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

N/A

Main supervisor (name and email)
and his / her institution

Prof. Francesco Petruccione,
petruccione@ukzn.ac.za
University of KwaZulu-Natal (Westville Campus)

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

No

Primary author: Dr JOSHI, Stuti (University of KwaZulu-Natal)

Co-authors: Prof. PETRUCCIONE, Francesco (University of KwaZulu-Natal); Dr ISMAIL, Yaseera (University of KwaZulu-Natal)

Presenter: Dr JOSHI, Stuti (University of KwaZulu-Natal)

Session Classification: Applied Physics

Track Classification: Track F - Applied Physics