Contribution ID: **150** Type: **Oral Presentation**

Quantum Optics: Do we need single photons?

Thursday, 10 July 2014 10:00 (20 minutes)

Abstract content
   (Max 300 words)
Formatting &
Special chars

An experimental measurement of quantum entanglement requires three crucial components: a non-linear crystal to generate entangled photons, avalanche photo-diodes to detect the single photons and a coincidence counter to measure the arrival of a photon pair. These components are not commonly found in an average South African optics laboratory and together with the presumed complexity of quantum theory, the undergraduate experiment course has become quantum-free. Internationally, however, quantum optics labs are receiving ever increasing attention as ground-breaking experiments, such as quantum teleportation, quantum key distribution protocols and quantum computing, are continually being realised. We can prevent ourselves from falling further behind in these technologies, but the solution is not additional funding, the solution is classical light. We show that using simple geometrical optics, the two-photon quantum correlations can be predicted using classical light. This means complex quantum experiments such as quantum ghost imaging can be simulated with only a diode laser, general optical components and a detector.

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

Yes

Level for award
 (Hons, MSc,
   PhD)?

PhD

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

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Would you like to
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No

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Session Classification: Education

Track Classification: Track E - Physics Education