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Digital spiral-phase bi-photon imaging

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Quantum ghost imaging using entangled photon pairs has become an interesting field of investigation as it illustrates the quantum correlation between the photon pairs. In ghost imaging, an object is placed in the signal arm and a mobile (bucket) detector is placed in the idler arm, such that it scans through the transverse plane of the idler beam to give coincidence counting rate. The amplitude (shape) of the object is recovered from the measured coincidence count rate. We introduce a new technique using digital holograms to recover not only the amplitude, but also the phase of digital object. Down-converted photon pairs are entangled in the orbital angular momentum basis, which are typically measured using a spiral phase hologram. Thus encoding a spiral annular slit hologram into the idler arm, we can recover the amplitude of the object by varying the slit radially and simultaneously, recover the phase by varying the spiral component. We show that there is a good correlation between the encoded object and the reconstructed images, without the need of a 'bucket' detector as in the traditional ghost imaging which only recovers the amplitude.

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

Yes

Level for award (Hons, MSc, PhD)?

MSc

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

Andrew Forbes

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

No

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