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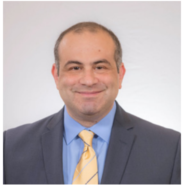

LIDAR ENHANCEMENT USING NON-CLASSICAL LIGHT

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The detection of objects in the presence of significant background noise is a problem of fundamental interest in sensing. In this talk I aim to demonstrate theoretically and experimentally how one can exploit non-classical light generated in monolithic semiconductor light sources in conjunction with non-local effects to enhance the performance of optical target detection and model LiDAR system.

Our protocols utilize quantum time-correlation which are obtained from a spontaneous parametric down-conversion sources. The protocols only requires time-resolved photon-counting detection, which is phase-insensitive and therefore suitable for practical target detection. As a representative comparison to such a detection protocol, we also consider a classical phase-insensitive target detection protocol based on intensity detection. Unlike classical target detection and ranging protocols, the probe photons in our detection protocol are completely indistinguishable from the background noise and therefore useful for covert ranging applications.

The experimental results agree very well with the theoretical prediction. In particular, we find that in a high-level environment noise and loss, our detection protocol can achieve performance comparable to that of the classical protocol that is practical in the optical regime.

Biography

I joined the department of Electrical and Computer engineering of the University of Toronto with a mixed experience in academic as well as industrial environments. I received both my M.Sc. (9/1995) and Ph.D. (11/1998) degrees from the University of Glasgow, Scotland, in the field of photonics. I was a European Union-sponsored research fellow on project to study difference frequency generation in III-V heterostructures using Quantum well intermixing in 1999. Between 2000 and 2004 I joined Agilent Technologies, where I was involved in developing different Photonic devices ranging form high reliability high power submarine-class 980 nm lasers, to DFBs for un-cooled high temperature operation, to integrated laser/modulator/amplifier devices. My Research Interests include; Photonic device physics and characterization techniques, non-linear optics in III-V semiconductors, applied optical spectroscopy for III-V optoelectronic devices and materials, III-V fabrication and monolithic integration techniques.