

# Quantum technologies for quantum measurements

## Author

JOHN G. RARITY – University of Bristol

## Abstract

This lecture will review the fields of quantum sensing, imaging and rangefinding technologies focusing on examples where application of quantum principles provides sensitivity gains. In particular I will investigate the benefits and limitations of quantum illumination in remote sensing and rangefinding. I will describe the advantages to using photon counting, pair photon sources, sub-shot noise schemes and most recently nonlinear interferometry.

I will illustrate the lecture with examples of covert rangefinding [1,2], remote sensing from gases [3], sensing at awkward wavelengths and low noise transmission measurements [4]. Finally, I will review early work showing quantum sensing potential in integrated quantum photonics [5].

1. G.S. Buller et al, Review of scientific instruments 76, 083112 (2005)
2. S. Frick et al, Optics Express 28, 37118 (2020)
3. M. Quatrevalet et al, IEEE JSTQE, 23, 5300311 (2017) (see also QLMtech.com)
4. J Sabines-Chesterking, et al, Optics express 27 (21), 30810-30818 (2018)
5. T. Ono et al, Optics Letts, 321: 1463 (2018).