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Quantum Illumination of Phase conjugate Receiver using Neyman Pearson target detecton test

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To detect the presence or absence of an object in concealed thermal noise, a parametric down conversion of a Gaussian squeezed entangled state is sent to space. In the environmental background, the quantum illumination (QI) entangled state is always much better than the optimal classical illumination (CI) target detection. We can easily provide the prior probability using the Neyman-Pearson technique rather than the Bayesian method. One of the primary advantages of quantum illumination receiver operating characteristics is the ability to compare the superior performance of two experimental setups. This paper compares the receiver operating characteristics of classical homodyne detection, optical parametric amplifier (OPA), and phase conjugate (PCR) photon counts. We demonstrate that the P CR configuration outperforms the other two scenarios and that the approximations of Ns $\ll$ 1 and NB $\gg$ 1 are compatible with the classical Gaussian distribution.

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