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Using a CNOT gate to improve detector efficiency KATHERINE BROWN, Louisiana State University, BEN FORTESCUE, Southern Illinois University, MOOCHAN KIM, CHRIS RICHARDSON, JONATHAN DOWLING, Louisiana State University — One of the most significant problems with photonic quantum computing is that of photon loss. Unfortunately detecting, and correcting for photon loss is made considerably more difficult due to the problem of inefficient photon detectors, which often have a detection efficiency far lower than that required for standard quantum error correction. In this presentation we will consider the problem of trying to detect the state of a photon at the end of our calculation with detectors that only have an efficiency of 90%. In particularly we will consider how entangling quantum gates can be used to boost the efficiency of the lossy detectors, and how this affects the accuracy of the result that can be obtained. We will compare two different procedures, one which allows us to determine whether the photon we are aiming to detect has been lost before or during the detection procedure, and the other which replaces a photon loss error with a bit flip error. This will allow us to show the trade off between detectable errors, and undetectable errors, something important to consider in quantum error correction.

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