Abstract Submitted
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Entangled Photon Holes[1] JAMES FRANSON, Johns Hopkins University — The probabilistic failure events of linear optics logic gates can be suppressed using the quantum Zeno effect enforced by strong two-photon absorption [1]. This would allow deterministic logic operations as a possible alternative to the use of cluster states. We have recently shown, however, that the rate of two-photon absorption can be substantially reduced by the generation of entangled photon holes that are analogous to the holes of semiconductor theory [2]. This reduction in the two-photon absorption rate is inconsistent with classical or semiclassical theory, and the entangled photon holes can violate Bell's inequality as well. As a practical matter, these difficulties can be avoided if the photons travel in opposite directions, in which case the entangled photon holes propagate away from each. The theory of entangled photon holes and their implications for the design of Zeno gates will be discussed.

1. J.D. Franson, B.C. Jacobs, and T.B. Pittman, Phys. Rev. A **70**, 062302 (2004).

2. J.D. Franson, submitted to Phys. Rev. Lett. (quant-ph/0510175).

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