Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Temporal Multiplexing toward Deterministic Single Photon Generation FUMIHIRO KANEDA, BRADLEY CHRISTENSEN, JIA JUN WONG, University of Illinois at Urbana-Champaign, HEE-SU PARK, Korea Research Institute of Standards and Science, KEVIN MCCUSKER, Northwestern University, PAUL KWIAT, University of Illinois at Urbana-Champaign — Heralded single photon sources via spontaneous parametric down-conversion have been a key technology for demonstrating small-scale quantum information processing, yet their low generation efficiency is also a key limitation for further scaling up quantum optical information technology. Multiplexed heralded single-photon sources [1-3] have been proposed for pseudo-deterministic generation of single photons without enhancing unwanted multi-photon generation. We report on our recent efforts toward a periodic and deterministic single-photon source by the use of an adjustable optical delay line and a high-efficiency heralded single-photon source. Multiplexing for up to 30 cycles of the periodically pumped heralded single-photon source, we observed a single-photon probability of 39 $\pm$ 1% in periodic output time windows, corresponding to more than six times enhancement over a non-multiplexed case, while the ratio of single- and multi-photon probabilities is as low as the non-multiplexed case. We anticipate that the time-multiplexing technique will enable larger scale quantum information processing system than ever realized. [1] A. L. Migdall, et al., PRA 66, 053805 (2002). [2] T. Pittman, et al., PRA 66, 042303 (2002). [3] K. McCusker and P. G. Kwiat, PRL 103, 163602 (2009).

Fumihiro Kaneda
University of Illinois at Urbana-Champaign

Date submitted: 27 Jan 2015 Electronic form version 1.4