

Abstract Submitted
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An Overview of HP's Research Towards Optical Quantum Information Processing¹ RAY BEAUSOLEIL, HP Laboratories — Quantum Information Science is an emerging discipline with the potential to revolutionize computation and communication, but with an extremely high barrier to realizing practical results. After describing a framework for performing optical quantum information processing [1], we will outline a set of key scientific and engineering challenges which must be met before a quantum information technology industry can materialize. As a first step toward developing scalable systems, we will describe experiments showing coherent population trapping in nitrogen- vacancy centers in diamond under optical excitation at zero magnetic field. [2] In addition, we will describe experiments demonstrating fabrication of massive photonic crystals using nanoimprint lithography, and the construction of an all-fiber self-calibrating random number generator based on polarization-entangled photons that generates high-quality cryptographic random numbers and is immune to back-door attacks.

[1] W. J. Munro, et al., J. Opt. B: Quant. Semiclass. Opt. **7**, S135–S140 (2005).

[2] C. Santori et. al., arXiv:cond-mat/0602573 (2006).

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