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Single Qubit Quantum Ring Oscillator and Applications for Storage and True Random Number Generation

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Quantum ring oscillators (QRO) are proposed as fundamental building blocks for several applications of interest. The QRO utilizes photons as qubit information carriers. In addition to serving as an oscillator, which has many uses, the structure can also be configured for use in other applications such as a qubit storage cell or as a true random number generator (TRNG). The structure of the QRO is analogous to a conventional electronic ring oscillator with qubits present in a superimposed state in one portion of the architecture that are evolved back into a basis state in another portion of the architecture. Thus the qubits, while in their basis state, are observable without affecting the overall functionality of the QRO. The feedback qubits alternate in binary basis states with a period equal to the delay of the circuit elements. Additionally, circuits for information carrier injection, measurement, and carrier extraction are discussed.

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