Abstract Submitted
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$\pi/3$ **Phase-Shift Quantum Searching** LOV GROVER, Bell Labs, Lucent Technologies — Quantum searching normally consists of an alternate sequence of selective inversion and diffusion operations. The algorithm has been extensively studied and is well understood. However, there was a surprising result that was discovered last year. According to this, if we change the selective inversions to $\pi/3$ phase shifts and adjust the sign of the phase shift in a prescribed manner, we obtain an algorithm that converges monotonically towards the solution [1]. This is in contrast to the well-known search algorithm that has an oscillatory character. This leads to a number of new and interesting applications. For example, if we consider a situation where the probability of getting a target state for a random item, is $1-\epsilon$ (with ϵ unknown), then the probability of getting a target state after a single query in the new algorithm, can be increased to $1-\epsilon^3$, classically this can be increased to only $1-\epsilon^2$. The performance of the new algorithm has recently been proved to be optimal. Another important application of this technique is in correction of systematic errors [2].
References -
(1) L.K. Grover (2005), Fixed-point quantum search, Phys. Rev. Letters, Oct. 3, 2005.
(2) B.W. Reichardt and L.K. Grover, Quantum error correction of systematic errors using a quantum search framework, Phys. Rev. A, Oct. 25, 2005

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