Quantum Physics

Qubit Coherent Control with Squeezed Light Fields

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We study the use of squeezed light for qubit coherent control and compare it with the coherent state control field case. We calculate the entanglement between a short pulse of resonant squeezed light and a two-level atom in free space and the resulting operation error. We find that the squeezing phase, the phase of the light field and the atomic superposition phase, all determine whether atom-pulse mode entanglement and the gate error are enhanced or suppressed. However, when averaged over all possible qubit initial states, the gate error would not decrease by a practicably useful amount and would in fact increase in most cases. We discuss the possibility of measuring the increased gate error as a signature of the enhancement of entanglement by squeezing.

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