MAR06-2005-004620

Abstract for an Invited Paper
for the MAR06 Meeting of
the American Physical Society

Teleportation of electronic many-qubit states via single photons

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I will describe a proposed a teleportation scheme[1] that relies only on single-photon measurements and Faraday rotation, for teleportation of many-qubit entangled states stored in the electron spins of a quantum dot system. The interaction between a photon and the two electron spins, via Faraday rotation in microcavities, establishes Greenberger-Horne-Zeilinger entanglement in the spin-photon-spin system. The appropriate single-qubit measurements, and the communication of two classical bits, produce teleportation. This scheme provides the essential link between spintronic and photonic quantum information devices by permitting quantum information to be exchanged between them. Work supported by DARPA/ARO DAAD19-01-1- 0490. [1] M. N. Leuenberger, M. E. Flatté, and D. D. Awschalom, Phys. Rev. Lett. 94, 107401 (2005).