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Entanglement Swapping via Collective Decay YUEH-NAN CHEN, National Cheng-Kung University, Taiwan — Quantum entanglement has achieved a prime position in current research due to its central role in quantum information science. Recently, attention has been focused on reservoir-induced entanglement with the purpose of shedding light on the generation of entangled qubits at remote separation [1]. In addition to the entanglement generation, a teleportation scheme for atomic and solid state qubits, which is based on the Dicke effect, is also proposed [1]. In contrast to usual schemes, it's a "one-pass" teleportation by a joint measurement Based on these, we go one-step further to propose a scheme for entanglement swapping. As shown in Fig. 1, the singlet entangled state is generated between atom 1 (2) and the left (right) cavity photon as atom 1 (2) has passed through the left (right) cavity. Atoms 1 and 2 then decay collectively. If the measurement outcome is a single photon with sub-radiant decay rate, entanglement swapping to the two cavity photons is achieved automatically. As for the result of one photon with super-radiant decay rate, all one has to do is to perform a phase-gate operation on the cavity photon state to complete the entanglement. [1] Y. N. Chen, D. S. Chuu, and T. Brandes, Phys. Rev. Lett. 90, 166802 (2003); New Journal of Physics 7, 172 (2005).

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