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Quantum trajectory simulation of a quantum teleportation protocol based on collective spontaneous emission RICHARD WAGNER, JAMES CLEMENS, Miami University — Recently a conditional quantum teleportation protocol has been proposed by Chen, *et al.* [*New J. Phys.* **7**, 172 (2005)] which is based on the collective spontaneous emission of a photon from a pair of quantum dots. We formulate a similar protocol for collective emission from a pair of atoms, one of which is entangled with a single mode of an optical cavity. We focus on the performance of the protocol as characterized by the fidelity of the teleported state and the overall success probability. We consider strategies employing temporally resolved photodetection, spatially resolved photodetection, and both in combination, of the emitted photon in order to distinguish superradiant from subradiant emission on the basis of a single detected photon. We find the fidelity approaches unity for all of the strategies as the spacing of the atoms becomes much smaller than the emission wavelength with a success probablity of 0.25. The fidelity remains above the classical limit of 2/3 for spatially resolved detection for arbitrary atomic separations with the ultimate limit of performance coming from the spatial resolution of the detectors.

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