Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Quantum dots as a source of entangled photon pairs. MARK STEVENSON, ROBERT YOUNG, Toshiba Research Europe Limited, PAOLA ATKINSON, KEN COOPER, DAVID RITCHIE, Cavendish Laboratory, University of Cambridge, ANDREW SHIELDS, Toshiba Research Europe Limited — Quantum dots are considered an attractive system for applications in quantum communication and quantum logic, confirmed by experimental demonstrations of quantum dot based single photon emission devices. Another key quantum optics resource is the on-demand generation of entangled photon pairs, for which the radiative decay of the biexciton state in a quantum dot has been proposed. The realization of such a device has been prevented due to polarization splitting of the exciton fine structure, caused by anisotropies of various structural parameters of the dot. We present the results of recent experiments that manage the splitting in quantum dots, in order to allow entangled photon emission. We demonstrate that dots with splitting within the homogeneous linewidth can be realized by carefully controlling the thickness of the dot layer. Furthermore, we show that the splitting can be reduced to zero by the application of an in-plane magnetic field. Polarization dependent correlation measurements on these dots will be presented that show characteristic features of entanglement, such as polarization correlation for all linear detection bases, and circular polarization anti-correlation. Our results indicate that for the first time, we have observed triggered entangled photon pair emission from a quantum dot.

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Date submitted: 29 Nov 2005 Electronic form version 1.4