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Photon Correlation Measurements on Vertically Coupled InAs/GaAs Quantum Dots[1] THUSHAN WICKRAMASINGHE, VENKATA THOTA, MAURICIO GARRIDO, ERIC STINAFF, Department of Physics and Astronomy, and Nanoscale and Quantum Phenomena Institute, Ohio University, Athens, OH 45701-2979, USA., ALAN BRACKER, DAVID GAMMON, Naval Research Laboratory, Washington, DC 20375, USA. — Quantum dots have shown fascinatingly unique properties that differ significantly from bulk material and their compatibility with semiconductor manufacturing makes them a candidate for quantum communication technology based optoelectronic devices. Coupled quantum dots (CQDs), formed by growing two sequential layers of dots with a separation of a few nanometers, results in a coherent molecular wave function that extends over the constituent dots providing a way to engineer the wave function. This allows for interesting configurations such as a bi-exciton state with a direct (electron and hole within the same dot) and indirect (electron and hole in different dots) transition. Emission from such a state will produce correlated, and possibly even entangled, photon pairs. We will present photon correlation measurements, using a Hanbury Brown and Twiss set up with single photon counting modules, on $In_{1-X}Ga_XAs$ CQDs embedded inside a GaAs based Schottky diode structure. Results from individual exciton transitions as well as bi-exciton transitions will be presented indicating such molecular-like excitons may provide a means for on-demand correlated, and potentially, entangled photon generation.

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