Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Creating an artificial periodic table using quantum dots PATANJALI KAMBHAMPATI, SAMUEL SEWALL, RYAN COONEY, McGill University — Confinement of carriers in quantum dots results in hydrogenic like states for the exciton. Thus a single excitation in a quantum dot bears resemblance to a hydrogen atom; these materials are often referred to as "artificial atoms." A pair of excitons will form a four body biexciton, akin to a helium atom. The excitonic 'He atom should have an eigenstate spectrum in the vein of atomic orbitals. The eigenstate spectrum of the biexciton has remained elusive due to the ultrafast timescale of relaxation processes in quantum dots which mask observation of the excited states. Here, we show the first, direct observation of spectrum of states of the biexciton, completing the analogy of excitons in quantum dots to atomic and molecular systems. We report on the first observation of a biexciton Stokes shift, which we will discuss in terms of non-Aufbau filling and biexciton fine structure. The observation of biexciton Stokes shift underpins the physics of optical gain in quantum dots.

Patanjali Kambhampati
McGill University

Date submitted: 11 Nov 2008 Electronic form version 1.4