Abstract Submitted
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Observation of Long Spin Coherence Times in CdSe/CdS Colloidal Nanostructures K.J. VAN SCHOOTEN, Department of Physics and Astronomy, University of Utah, Salt Lake City, Utah, 84112, USA, J. HUANG, D.V. TALAPIN, Department of Chemistry, The University of Chicago, Chicago, Illinois 60637, USA, W.J. BAKER, C. BOEHME, J.M. LUPTON, Department of Physics and Astronomy, University of Utah, Salt Lake City, Utah, 84112, USA — Spin states in colloidal quantum dots have been intensively studied over the past decade, usually through various all optical time-resolved pump-probe techniques of excitonic fine-structure. Coherence times measured in this manner, which are usually limited to T_2^*, have ranged in order from 1ps to 1ns, thus limiting the potential to use these types of quantum dots in quantum memory schemes. Here, we describe coherence times (T_2) on the order of 100ns for optical excitations in ensembles of CdSe/CdS heterostructure colloidal nanocrystals at 10K. In contrast to the more conventional pump-probe techniques, we employ a time-correlated optically-detected magnetic resonance scheme to measure the true T_2 of optically generated excitations via a Hahn echo sequence. A strong temperature dependence of the spin-dependent luminescence rate is observed, demonstrating that longitudinal spin-relaxation in these strongly spin-orbit coupled semiconductors is thermally activated.

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