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Ultrafast flipping of exciton spin orientation in colloidal CdSe quantum dots GREGORY SCHOLES, University of Toronto, VANESSA HUXTER, University of Toronto, VITALIJ KOVALEVSKIJ[1], University of Toronto —
A nonlinear optical spectroscopy is demonstrated that retrieves exciton spin orientation dynamics using linearly polarized excitation. Rotationally averaged optical selection rules for quantum dots dictate that the sign of the signal is reversed when the spin state flips. Results are reported for CdSe nanocrystal samples with mean diameters from 3.1 nm to 5.0 nm. Ultrafast exciton spin flip times correspondingly range from 236 fs to 1.2 ps. Implications for quantum computation and spintronics applications are that exciton transitions can be used to induce long-lived spin polarization, but memory of exciton spin orientation decays on times less than 1 ps.

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