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Coherent Control of Entangled Spin Pairs in a CdMnTe Quantum Well. PAUL JACOBS, ROBERTO MERLIN, University of Michigan, JACEK FURDYNA, University of Notre Dame — We used ultrafast light pulses to control the spin state of electrons bound to donors in a CdMnTe quantum well. Previously, we reported on the observation of up to three harmonics of the bound electron spin flip transition indicating that at least three bound electron sites were entangled(J.M. Bao, A.V. Bragas, J.K. Furdyna, R. Merlin, Phys. Rev. B 71 045314 (2005)). Using a pulse shaper, we are now able to suppress all coherent oscillations, but the signal of the first spin flip overtone. Therefore, only entangled electron pairs remain oscillating; all non-entangled donor bound electrons have been restored to their ground state. The quantum state of the remaining entangled electron spins is closely related to the Bell state. This technique holds promise for quantum computing applications.

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