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Theory of the effect of detuned optical pulse trains on the electron-nuclear hyperfine interaction in quantum dots SOPHIA ECONOMOU, SAM CARTER, Naval Research Lab, ANDREW SHABAEV, George Mason University, TOM KENNEDY, ALLAN BRACKER, TOM REINECKE, Naval Research Lab — A train of optical pulses detuned from resonance of the electron spin-trion transition in a quantum dot has the combined effect of generating and of rotating the spin polarization. The rotation is a direct consequence of the detuning and induces an electronic spin component parallel or antiparallel to the magnetic field, depending on the sign of the detuning. This electron spin component directs the nuclear spin to preferably flip in one direction. This pulse-assisted electron-nuclear flip-flop both affects the electron, because it changes the precession frequency and changes whether it is synchronized with the pulses, and it also opens up the opportunity for manipulating the nuclear polarization by using the detuning along with the pulse repetition rate as handles.

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