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Faster pulse sequences for performing arbitrary rotations in singlet-triplet qubits[1] ROBERT THROCKMORTON, University of Maryland, College Park, EDWIN BARNES, Virginia Tech, XIN WANG, City University of Hong Kong — We present new composite pulses that perform universal single-qubit operations in singlet-triplet spin qubits faster than existing methods. We introduce two types of composite pulses: one that generalizes the standard Hadamard-x-Hadamard sequence used to perform rotations about the z axis, and another that generalizes a sequence proposed by Guy Ramon (G. Ramon, Phys. Rev. B **84**, 155329 (2011)). We determine how much time it takes to perform each set of pulses and find that our "generalized Hadamard-x-Hadamard" sequence can be made faster than any of the other sequences. We also present composite pulses for performing x rotations and show that a generalization of the Hadamard-z-Hadamard sequence is faster than other existing sequences, as well as faster and more precise than performing x rotations with single pulses. We present versions of these gates that also dynamically correct for noise-induced errors along the lines of SUPCODE (X. Wang *et. al.*, Phys. Rev. A **89**, 022310 (2014)).

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