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Direct Synthesis of Microwave Waveforms for Quantum Computing JAMES RAFTERY, IBM, ANDREI VRAJITOAREA, GENGYAN ZHANG, ZHAOQI LENG, SRIKANTH SRINIVASAN, ANDREW HOUCK, Princeton University — Current state of the art quantum computing experiments in the microwave regime use control pulses generated by modulating microwave tones with baseband signals generated by an arbitrary waveform generator (AWG). Recent advances in digital analog conversion technology have made it possible to directly synthesize arbitrary microwave pulses with sampling rates of 65 gigasamples per second (GSa/s) or higher. These new ultra-wide bandwidth AWG's could dramatically simplify the classical control chain for quantum computing experiments, presenting potential cost savings and reducing the number of components that need to be carefully calibrated. Here we use a Keysight M8195A AWG to study the viability of such a simplified scheme, demonstrating randomized benchmarking of a superconducting qubit with high fidelity.

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