# Superconducting quantum computation in the age of quantum supremacy

Over the last 20 years, superconducting quantum computers have gone from single-qubit

experiments to complex computational systems. This evolution culminated in Google's 53 qubit Sycamore processor which provided the first experimental demonstration of quantum supremacy, performing a calculation faster than the largest classical supercomputers in the world. Current systems involve a range of microwave devices from qubits, linear resonators, and microwave amplifiers, to packaging and cabling. Here, we discuss these technologies in the context of Google's Sycamore quantum processor - a 53 qubit processor with nearest-neighbor coupling and programmable single- and two-qubit gates. Specifically we address advances that made it possible to operate a quantum processor of this size and complexity as well as recent experiments it has enabled.

Theodore White received a B.S. in physics from The State University of New York at Binghamton in 2009 and a Ph.D. in physics from the University of California Santa Barbara in 2015. Since then, he has worked as a research scientist at Google Inc with a focus on superconducting quantum computation. While involved with many aspects of this research, his primary focus has been on improving microwave dispersive readout through the development of better superconducting microwave amplifiers and miniaturized components.