UTSA Quantum Research Cluster

PRESENTS

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February 24, 2021 | 10:30 - 11:30 AM

QUANTUM COMPUTATIONAL SUPREMACY

In Fall 2019, a team at Google made the first-ever claim of "quantum computational supremacy"---that is, a clear quantum speedup over a classical computer for some task---using a 53-qubit programmable superconducting chip called Sycamore. In Fall 2020, a group at USTC in China made a claim of quantum supremacy, using "BosonSampling" (a proposal by me and Alex Arkhipov in 2011) with 50-70 photons in an optical network. In addition to engineering, these accomplishments built on a decade of research in quantum complexity theory. This talk will discuss questions like: what exactly were the contrived computational problems that were solved? How does one verify the outputs using a classical computer? And how sure are we that the problems are indeed classically hard? I'll end with a proposed application for these sampling- based quantum supremacy experiments---namely, the generation of certified random bits, for use (for example) in proof-of-stake cryptocurrencies---that I've been developing and that Google is working to demonstrate.

Scott Aaronson is David J. Bruton Centennial Professor of Computer Science at the University of Texas at Austin. He received his bachelor's from Cornell University and his PhD from UC Berkeley. Before coming to UT Austin, he spent nine years as a professor in Electrical Engineering and Computer Science at MIT. Aaronson's research in theoretical computer science has focused mainly on the capabilities and limits of quantum computers. His first book, Quantum Computing Since Democritus, was published in 2013 by Cambridge University Press. He received the National Science Foundation's Alan T. Waterman Award, the United States PECASE Award, the Vannevar Bush Fellowship, and the Tomassoni-Chisesi Prize in Physics.

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