Quantum Computing

3/3/21 1:01 PM

Speaker: Scott Aaronson (University Texas)
Date: 3/3/2020

Quantum mechanics

- A certain rule of generating probabilities themselves
- "Probability theory with minus signs"
- Two complex numbers called amplitudes, satisfying sum of norms to 1. A 2-state superposition is called a qubit

A quantum computer is NOT like a massively-parallel classical computer

- Quantum computer can generate exponentially many possible answers, but we only get to observe one of them
- Any hope for a speedup rides on choreographing an interference pattern that boosts the amplitude of the right answer

Difficulties

- Decoherence: unwanted interaction between the QC and its environment, prematurely "measuring" the QC
    - The more operations and qubits, the worse things get
- In most QC researchers' view, quantum fault-tolerance provides the ultimate theoretical solution to decoherence
    - But we are not there yet

Quantum Supremacy

- Boson Sampling