

NISQ Computers

EE599-001 & EE699-010, Spring 2026

Hank Dietz

<http://aggregate.org/hankd/>

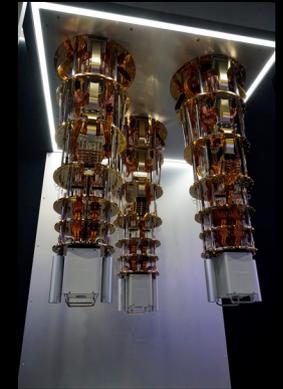
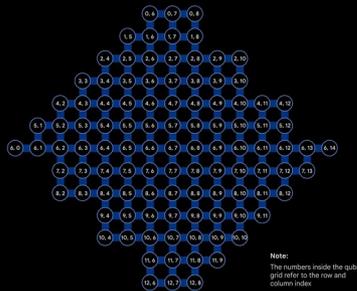
What is NISQ?

- **Noisy Intermediate-Scale Quantum (NISQ)**
 - As good as we have so far...
 - Tens to a few thousand qubits
 - Short coherence time
 - Noisy, with gate and measurement errors
- Work arounds
 - Quantum approx. solves subproblems
 - Error correction

Some Quantum Computers



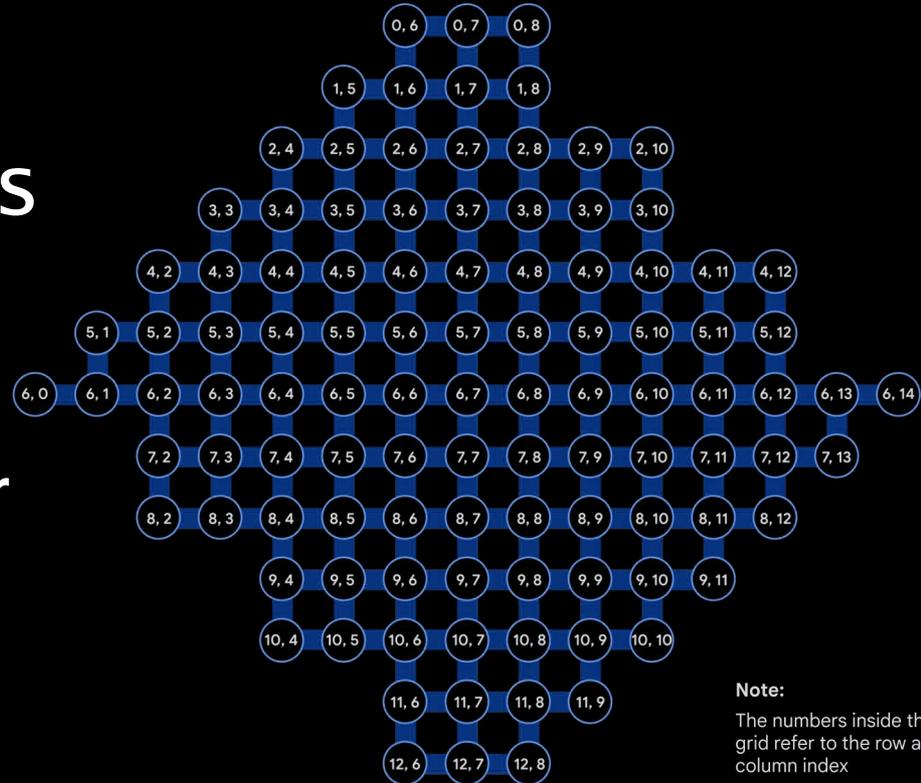
Qubit grid



- IBM Condor: 1,121 superconducting
- China's Tianyan-504: 504 superconducting
- IQM: up to 150 superconducting
- Google Willow: 105 superconducting
- Rigetti Ankaa-3: 84 superconducting
- Fujitsu: 64 superconducting, 10 spin

Some Details about Willow

- Willow “connectivity” is 3.47 average, 5 max
- Gate(q): 0.036% error
Gate(q,q): 0.14%
Measurement: 0.67%
- Coherent for $\sim 98\mu\text{s}$, 40 gates



More Quantum Computers



- Intel Tunnel Falls: 12 spin
- Microsoft Majorana 1: 8 topological
- Quantinuum H2-1: 56 trapped ion
- IonQ Forte Enterprise: 36 trapped ion
- SpinQ: 20 superconducting, 2 spin (NMR)

Photonic Quantum Computers

- PsiQuantum: photonic chips
- QCI: photonic chips



Not As Programmable

- DWave: 5000+ adiabatic quantum annealing
- Xanadu: 12 boson sampling photonic
- Homemade: 1 photonic

