

Real-world Results

IonQ vs Peers



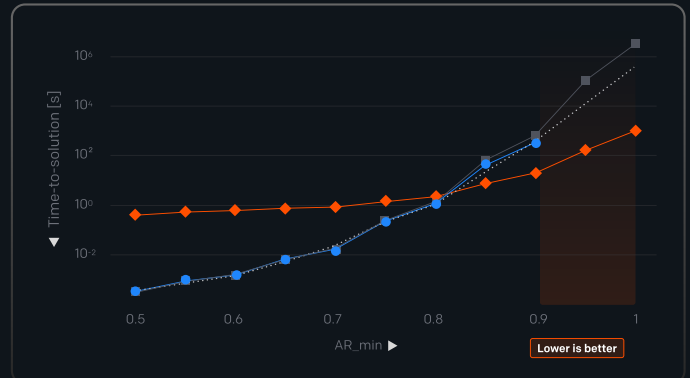
LR-QAOA

Linear-Ramp QAOA

TTS

IonQ's system returns qualifying answers, even at the highest quality threshold (orange area). At that same quality bar, competing superconducting systems produce results statistically indistinguishable from random sampling, meaning the answers they return carry no useful signal and their projected Time-to-Solution reaches ~100,000 seconds.

IonQ Forte Leading SC System e^{ax^2+bx+c} Fit Rnd. Baseline



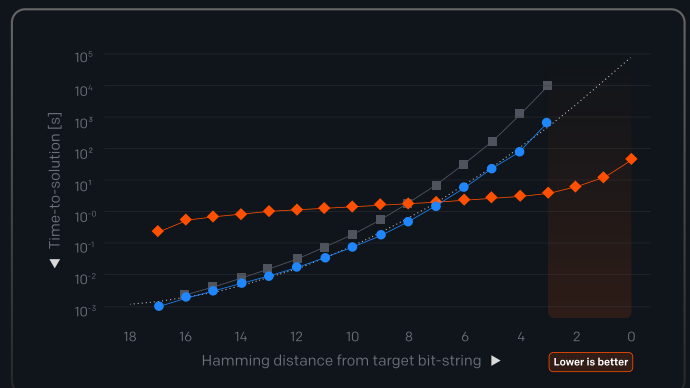
QFT Suite

Quantum Fourier Transform Suite

TTS

IonQ's system delivers solutions in minutes, and its Time-to-Solution rises gradually as the accuracy target tightens. Competing systems' Time-to-Solution grows exponentially, and at the tightest targets (orange area), their results approach what you would expect from a system dominated by noise, and Time-to-Solution becomes impossibly high.

IonQ Forte Leading SC System e^{ax^2+bx+c} Fit Rnd. Baseline



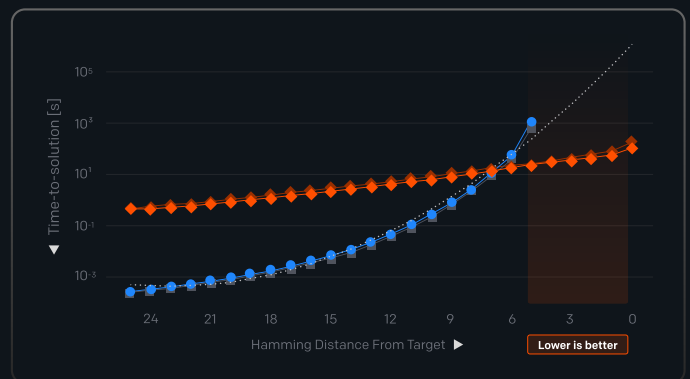
HSBP

Hidden Shift Benchmark Problem

TTS

IonQ's systems return qualifying answers across the full range of quality requirements, including the hardest targets (orange area). Competing systems fail to produce valid results before reaching the highest bar, meaning they cannot complete this benchmark at the required standard for this problem size.

IonQ Forte IonQ Forte-E Leading SC System e^{ax^2+bx+c} Fit Rnd. Baseline



The Quantum Benchmark Suite

Foundational Subroutines

FAA Fixed Point Amplitude Amplification

Quality

QFT Quantum Fourier Transform Suite

TTS

Quality

HSBP Hidden Shift Benchmark Problem

TTS

Quality

High Energy Physics

Neutrinoless Double Beta Decay Simulation

Quality

Data Loading

Tensor Network Circuits Image Loading via MPS

Quality

Machine Learning

qCNN Quantum Convolutional Neural Network

Quality

Quantum Copula Portfolio Risk Analysis

Quality

Optimization

QAOA Quantum Approximate Optimization Algorithm

Quality

LR-QAOA Linear-Ramp QAOA

TTS

Quality

varQITE Variational Quantum Imaginary Time Evolution

Quality

Quantum Chemistry

VQE with UpCCD Variational Quantum Eigensolver

Quality

QC-AFQMC

Quality

Quantum-Classical Auxiliary Field Quantum Monte Carlo

Simulation

QLBM Quantum Lattice Boltzmann Method

Quality