Benchmarking of quantum processors with random circuits

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Quantum processors with sizes in the 10-100 qubit range are now commonplace. However, with increased size comes increased complexity for benchmarking. The effectiveness of a given device may vary greatly between different tasks, and wont always be easy to predict from single and two qubit gate fidelities. For this reason, it is important to assess processor quality for a range of important tasks. In this work we propose and implement tests based on random quantum circuits. These are used to evaluate four different superconducting qubit devices, with sizes from 5 to 19 qubits, from three hardware manufacturers: IBM Research, Rigetti and Alibaba.

INTRODUCTION

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