Comparing Extrapolation Methods: Pulse Stretching and Gate Insertion

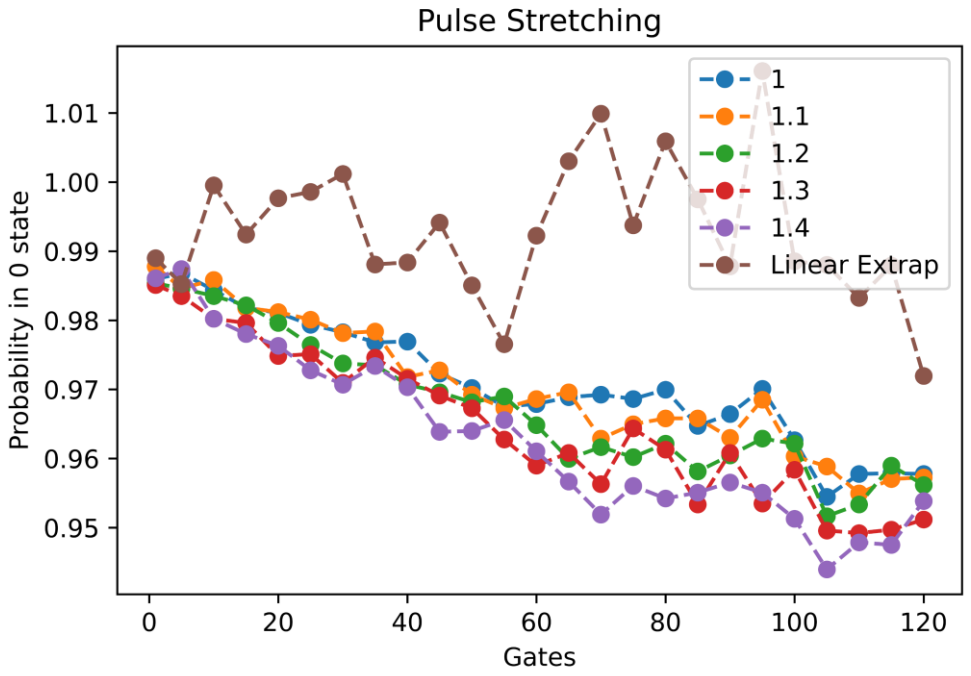
November 17, 2020

Randomized Benchmarking

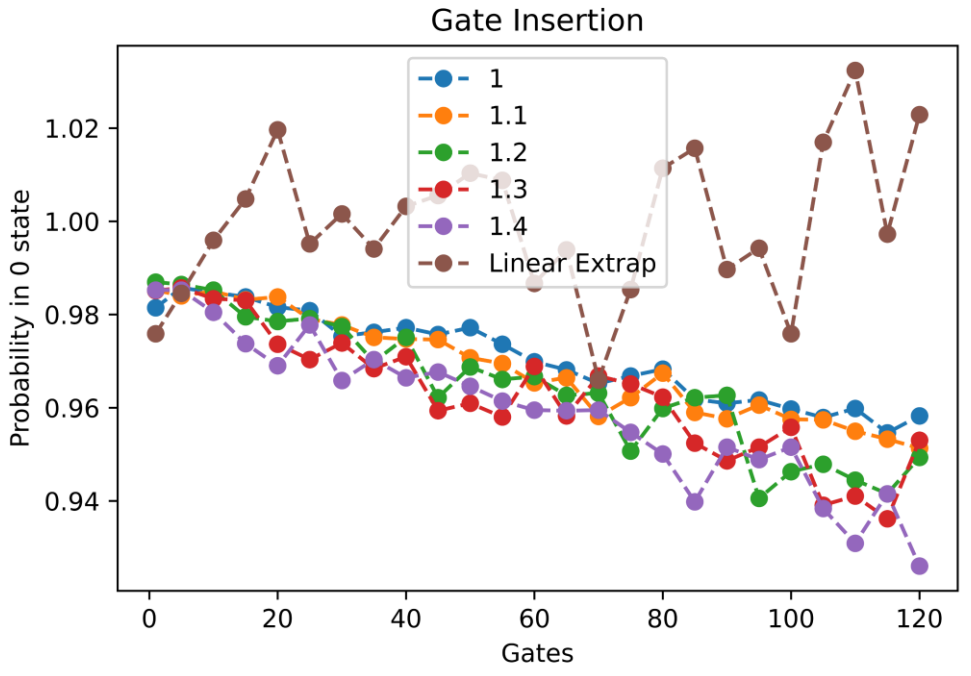
- All qubits are initialized in the 0 state
- Then we generate a circuit of n gates which add up to identity
- Result should be all qubits in 0 state but practically, due to noise, that is dependent on number of gates in the circuit
- The more gates, the more noise and hence less probability of getting the initial state
- In the following slides, on top of the number of gates, we amplify noise using pulse stretching and gate insertion.
- Ideally, extrapolated outcomes should imply that P(initial state) = 1

Single Qubit Randomized Benchmarking

Pulse Stretching

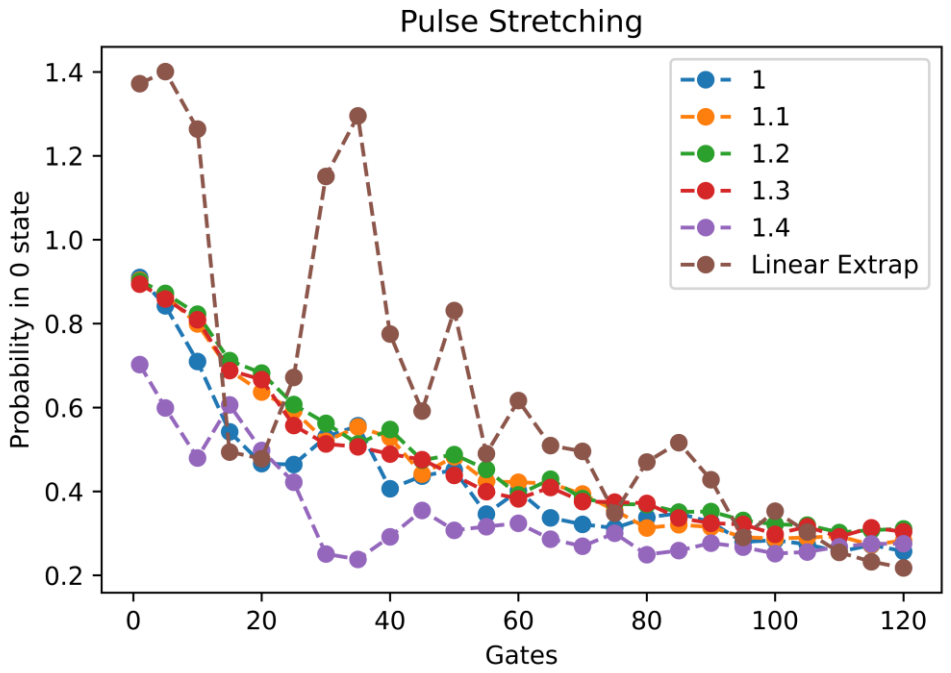


Gate Insertion

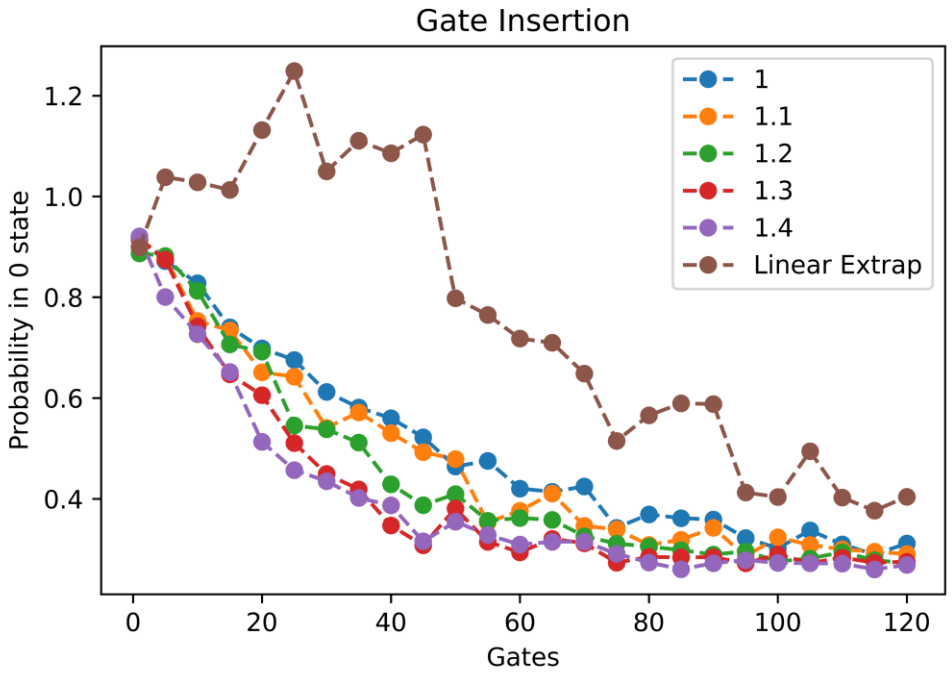


Two Qubit Randomized Benchmarking

Pulse Stretching



Gate Insertion



* The gate count as shown by x axis is representative of the circuit before it went through gate insertion procedure