UNIVERSITÀ DEGLI STUDI DI MILANO

FACOLTÀ DI SCIENZE E TECNOLOGIE

Master degree in Physics

Title

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Results

3.1 RB fidelity optimization

3.1.1 Randomized Benchmarking

Randomized benchmarking (RB) is technique used to characterize the performance of quantum gates measuring their avarage error rates. RB was firstly introduced in 2005 [1], the key idea

disclaimer: this first study was performed using `qibocal v0.1` the code currently uploaded on thi GitHub repository is instead compatible with `qibocal v0.2` Main idea: improve fidelity (which one?) fine tuning the calibration

Randomized Benchmarking

For the results we present in the following the technique used slightly differ from the

Randomized Benchmarking on `qua`

3.1.2 Optimization methods

`Optuna` [**Optuna**]

`Scipy` **methods** [**Scipy**]

- SQLP ?
- Nelder-Mead → approfondimento

CMA - genetics algorithm [**CMA**]

3.2 RX90 calibration

3.3 Flux pulse correction

3.3.1 Cryoscope

[2]

Chapter 4

Conclusions

Bibliography

[1] J. Emerson, R. Alicki, and K. Życzkowski, "Scalable noise estimation with random unitary operators", Journal of Optics B: Quantum and Semiclassical Optics **7**, S347 (2005).

[2] M. A. Rol, L. Ciorciaro, F. K. Malinowski, B. M. Tarasinski, R. E. Sagastizabal, C. C. Bultink, Y. Salathe, N. Haandbaek, J. Sedivy, and L. DiCarlo, "Time-domain characterization and correction of on-chip distortion of control pulses in a quantum processor", en, Applied Physics Letters **116**, arXiv:1907.04818 [quant-ph], 054001 (2020).

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