

Development of an open-source calibration framework for superconducting qubits

Master degree in Physics

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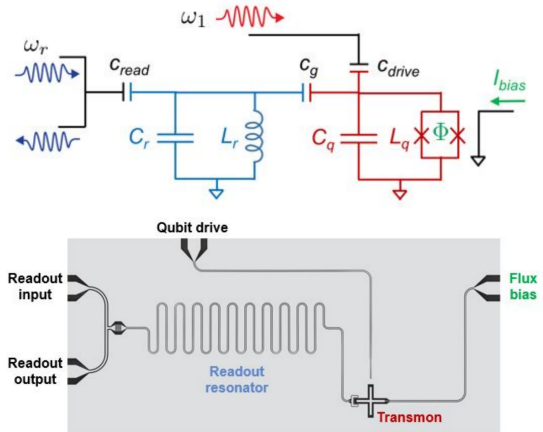
1. Superconducting qubits
2. Average Clifford gate fidelity optimization
3. Library additions
4. Conclusions & Outlooks

Superconducting qubits

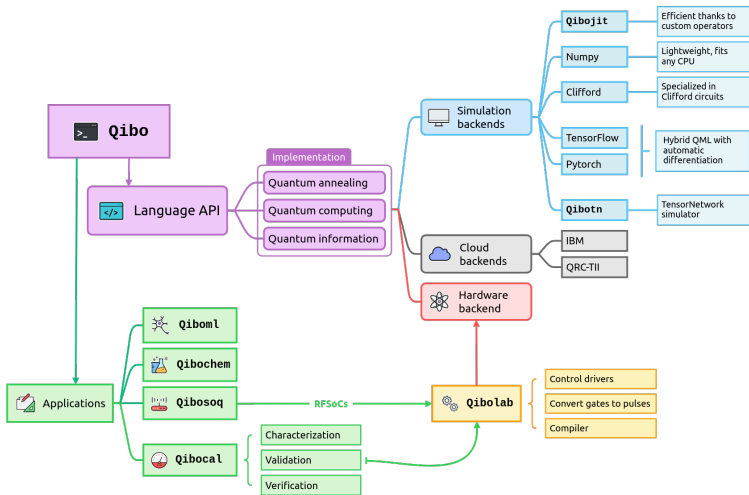
Artificial atoms

Qubit: two level system Superconducting
qubits: use Josephson Junctions to build
anharmonic oscillators

State readout



Qibo framework



Average Clifford gate fidelity optimization

Library additions

Conclusions & Outlooks

Questions?

References

What is for?




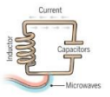












Simulation of quantum system: "Nature isn't classical, dammit, and if you want to make a simulation of nature, you'd better make it quantum mechanical, and by golly it's a wonderful problem, because it doesn't look so easy"



Other quantum computing

1. Optimization and modeling (finance, traffic, weather...)
2. Quantum algorithms
3. Quantum Machine Learning

Qubit platforms

	atoms	electron superconducting loops & controlled spin					photons	
	 <p>Laser</p> <p>Electron</p> <p>trapped ions</p> <p>Factory IONQ</p> <p>Honeywell</p> <p>AQT</p> <p>OXFORD IONICS</p> <p>eleQtron</p>	 <p>cold atoms</p> <p>PASQAL</p> <p>ATOM COMPUTING</p> <p>ColdQuanta</p> <p>IQEra</p>	 <p>quantum annealing</p> <p>D:WAVE The Quantum Computing Company</p> <p>QILMANJRO QUANTUM TECH</p> <p>NEC</p>	 <p>Current</p> <p>Inductor</p> <p>Capacitors</p> <p>Microwaves</p> <p>super-conducting</p> <p>Google amazon</p> <p>intel IBM</p> <p>OQC rigetti</p> <p>QINFORM QUANTUM</p> <p>ALICE & BOB Nord Quantique</p> <p>IANYON IQM</p> <p>EeroQ FUJITSU</p> <p>bleximo</p>	 <p>Microwaves</p> <p>silicon</p> <p>QUANTUM MOTION</p> <p>intel</p> <p>Silicon Quantum Computing</p> <p>NTT</p> <p>equal1.labs</p> <p>QuTech</p> <p>ARCHER</p>	 <p>Electron</p> <p>Vacancy</p> <p>Laser</p> <p>NV centers</p> <p>TURING</p> <p>QUANTUM BRILLIANCE</p>	 <p>Time</p> <p>topological</p> <p>Microsoft</p> <p>NOKIA</p>	 <p>photons</p> <p>XANADU</p> <p>ORCA Computing</p> <p>Bosch</p> <p>PsiQuantum</p> <p>TUNDRA SYSTEMS GLOBAL LTD</p> <p>LightOn</p> <p>QUANDELA</p> <p>QuIX</p> <p>BardeenQ</p>
vendors								
labs (*)	 <p>IQST</p> <p>MIT</p> <p>KIT</p> <p>Sandia National Laboratories</p> <p>NIST</p> <p>HARVARD UNIVERSITY</p> <p>US UNIVERSITY OF SUSSEX</p>	 <p>CNRS</p> <p>INSTITUT d'OPTIQUE</p> <p>HARVARD UNIVERSITY</p> <p>JÜLICH Forschungszentrum</p> <p>PennState</p> <p>EPFL</p> <p>THE OHIO STATE UNIVERSITY</p>	 <p>NEDO</p> <p>Stanford University</p> <p>MIT</p> <p>KIT</p> <p>MCQST</p> <p>ETH zürich</p> <p>(*) non exhaustive inventory, missing Chinese labs among others</p>	 <p>cea</p> <p>CNRS</p> <p>MIT</p> <p>QuTech</p> <p>UMass Amherst</p> <p>ETH zürich</p> <p>Berkeley</p> <p>Yale</p> <p>東京大学 THE UNIVERSITY OF TOKYO</p>	 <p>cea</p> <p>CNRS</p> <p>University of BRISTOL</p> <p>UNSW</p> <p>Yale</p> <p>HRL LABORATORIES</p> <p>ETH zürich</p> <p>EPFL</p> <p>WISCONSIN</p> <p>RIKEN</p> <p>PRINCETON UNIVERSITY</p>	 <p>cea</p> <p>CNRS</p> <p>MIT</p> <p>TU Delft</p> <p>HARVARD UNIVERSITY</p> <p>University of CHICAGO</p>	 <p>cea</p> <p>CNRS</p> <p>UCSB</p> <p>TU Delft</p> <p>QuTech</p> <p>Niels Bohr Institute</p> <p>THE UNIVERSITY OF SYDNEY</p>	 <p>CNRS</p> <p>University of BRISTOL</p> <p>UNIVERSITY OF OXFORD</p> <p>SAPIENZA University of ROMA</p> <p>universität wien</p> <p>東京大学 THE UNIVERSITY OF TOKYO</p>

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