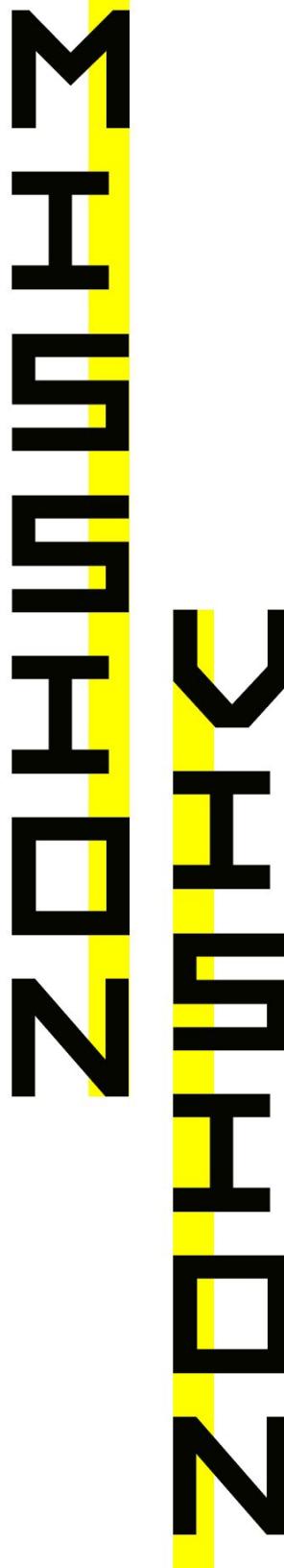


# ANNUAL REPORT

## 2022 Unitary Fund

Unitary Fund is a 501(c)(3) non-profit whose mission is to create a quantum technology ecosystem that benefits the most people. We believe that expanding the pool of people working on quantum technologies is a way to ensure that the benefits of these tools are widely, swiftly, and equitably distributed.



We work to create a more inclusive quantum, open source community by supporting new and innovative projects, while also researching and developing tools to further accelerate a quantum technology ecosystem for all.

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# MESSAGE FROM THE PRESIDENT

To the Unitary Fund community,

Technology often surprises us with its pace of development. Like many of you, I have been fascinated by recent releases in machine learning. Language and vision models like [GPT-4](#), [Claude](#), [Midjourney](#), [Stable Diffusion](#) have debuted impressive features that have many updating their [estimates](#) for how soon Artificial General Intelligence may be developed. How has this happened?

Firstly, these results rely on long term investments in computing hardware. From CPUs to GPUs, TPUs, Apple Silicon and other new processors, the decades of hardware development that has led to today's cloud computing resources have made these leaps possible. The seeds that we are now planting in quantum technologies across computing, networks and sensing will similarly grow over decades and form the foundation of new advances to come.

Secondly, the dominance of open source toolkits and communities has both accelerated machine learning and, so far, made those developments relatively accessible to researchers and companies across the world. It is an active and important conversation about what direction the future of AI will take, but there have been many benefits to how open it has been thus far. Similarly, our mission at Unitary Fund is to ensure that a thriving open ecosystem for quantum technologies can help them develop faster and to the benefit of more people.

The investments we make now in the open quantum technology ecosystem have a huge impact on our future.

We've driven this mission further last year,

- launching [Metriq](#), the open community-driven platform to host and share quantum technology benchmarks
- growing [Mitiq](#), the first open-source toolkit for quantum error mitigation to over 70,000 downloads and 50 code contributors
- running [unitaryHACK](#) with awarded bounties to over 63 merged pull requests across 30 projects with the help of 45 maintainers and hundreds of "quantum hackers"
- building and launching the Quantum Open Source Software [Survey](#) and collected over 1000 responses.
- awarding [14 grants](#) to amazing projects, spanning from the first Rust projects supported by UF to an outreach program for highschool students.

and much more that you will read about in the following pages.

We are so grateful to our supporters, advisors, grants winners, open source contributors, hackathon participants and others who have all come together to form the growing Unitary Fund community. Thanks to all of you who have joined us in this mission.

We are just getting started,

**WILLIAM ZENG, PHD**  
President

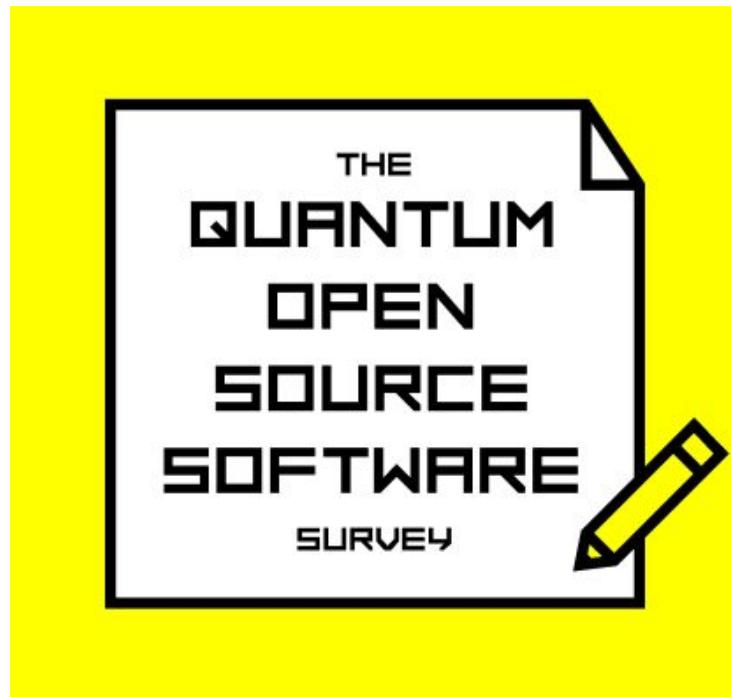


# 2022 AT A GLANCE

*Provide increased support for community projects  
that make the open quantum research ecosystem more robust.*

# MILESTONES

---



**1000+**

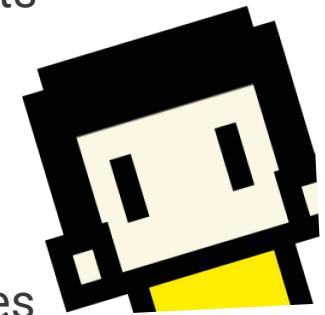
respondents from around the world

## unitaryHACK 2022

**19%** more participants

**58%** more projects

**154%** more bounties



**44** community project channels  
hosted on Discord

**30** new Mitiq papers citations

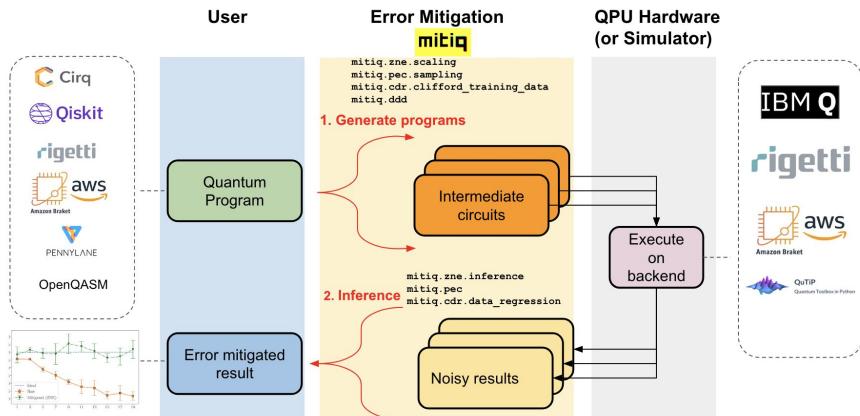
**10** Organizations in the Metriq  
consortium

# MILESTONES



**Mitiq** is an open source toolkit for implementing error mitigation techniques on most current intermediate-scale quantum computers.

## Cross-Platform Quantum Error Mitigation with Mitiq

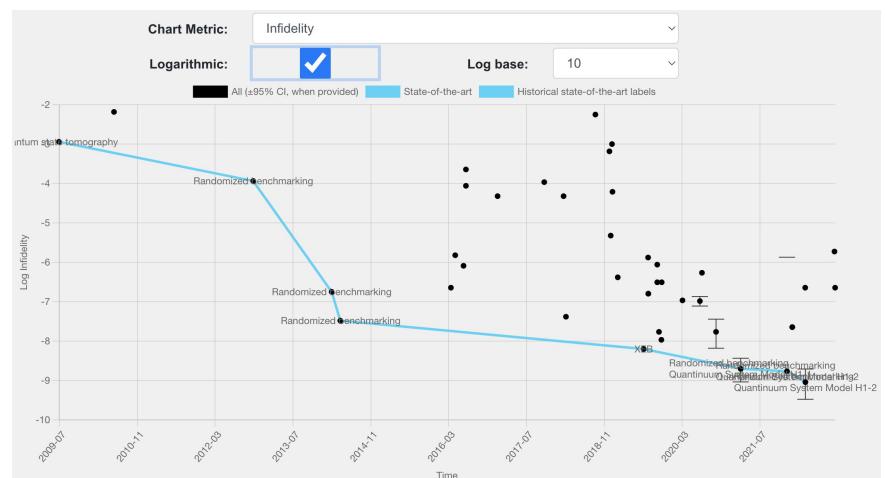


### Milestones:

Released versions 0.12 → 0.22 on PyPI  
Added dynamical decoupling and readout error mitigation to the supported techniques.



**Metriq** is an open source software to make transparent, accessible benchmarks available to everyone in the quantum computing community.



### Milestones:

Launched in June 2022!  
Released platform versions 0.1.0 → 0.6.1  
Benchmark Submissions: 360+

# UF MEMBERS

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Our members play a pivotal role in supporting our mission, ensuring that the quantum technologies that the community develops benefit everyone. The quantum ecosystem has benefitted from generous annual corporate gifts as well as company matches of employee donations and volunteer hours. Thank you!

**IBM Quantum**

**scientifica**  
venture capital

Core Members

Supporting  
Members



**Covalent.**



**DoraHacks**

 **PASQAL**



QUANDELA Cloud

 **qyber**

 **atom computing**

 **BCG**

 **iqt LABS™**

 **qcWARE**

 **IQuEra**

 **river Lane**

 **XANADU**

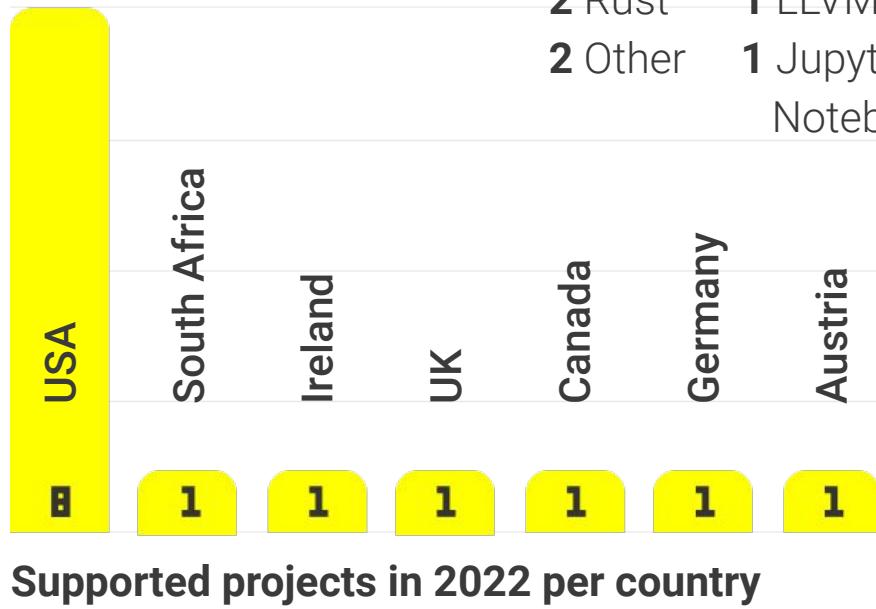
Other  
Supporters

Read more about our members and supporters at [https://unitary.fund/posts/2023\\_members.html](https://unitary.fund/posts/2023_members.html).

**UNITARY FUND  
COMMUNITY**

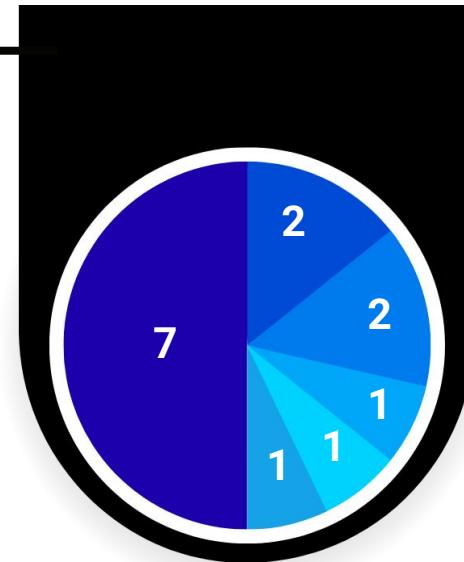
# MICROGRANT PROGRAM

Unitary Fund's Microgrant Program supports the growth of a diverse quantum community by investing in projects that can benefit everyone. Since we began we have distributed **71 grants** with no-strings attached across **23 countries** resulting in **17+ completed or planned publications**, welcoming **13 people** into the field, and helping to form **2 new startups** and **1 new non-profit**. We are thrilled that **65%** of the grants we distributed in **2022** were awarded to applicants from underrepresented groups. Below you can find some statistics about the **2022 grants**. The up-to-date list of all grants can be found on the Unitary Fund [website](#).



## Programming languages

| Language         | Count |
|------------------|-------|
| Python           | 7     |
| C++              | 1     |
| Rust             | 2     |
| LLVM             | 1     |
| Other            | 2     |
| Jupyter Notebook | 1     |



# MICROGRANT PROGRAM

## Microgrant Video Series

Hosted by UF Technical Staff Member Misty Wahl, watch to learn more about our featured grant winners, their projects, their experience after winning the grant, and what they're working on now.



## Internship Program

Karen and Maria joined the Unitary Fund team over the Summer as part of Qubit by Qubit Early Quantum Career Immersion Program, and worked on the Metriq project, contributing to populate the database and develop the Python client.



**KAREN REZKALLA**  
University of Maryland



**MARIA MARYAM**  
CUNY Queens College



*We learned how git works and how to use it thanks to Dan who guided us through every hurdle in the process. After a week of constant researching and trial and error, I finally had the frontend and backend environments accessible on my computer! I learned from Dan so much throughout that week. Mostly how experience, especially with software environments, betters your problem solving skills but also patience.- **Karen Rezkalla**. Read more on the UF blog ([Karen](#), [Maria](#))*



# 2022 GRANT RECIPIENTS

---

Lev Stambler to write a highly performant decoder in Rust for quantum error correction.



**Stefanie Muroya Lei and Christoph Kirsch**, to develop **QUARC** within the Unicorn framework, a Rust project for bounded model checking that verifies classical programs using the best classical and quantum algorithms.

Omid Khosravani to develop adaptive quantum process tomography techniques through the use of reinforcement learning.

Kaitlin Gili to conduct an outreach project called **Iteration One**, sparking curiosity among U.S. high school students with the most limited access to physics and computer science knowledge.

**“** The Unitary Fund Microgrant program has provided me with the means to carry out an impact project that will reach 100s of students across the US who wouldn't traditionally have access to knowledge in quantum computing, or have the opportunity to meet a quantum scientist in person! - **Kaitlin Gili, Iteration One** **”**

Abdullah Khalid to write a methods focused **guide** to quantum error correction with interactive [tutorials](#).



**Hong-Ye Hu, Yi-Zhuang You, and Susanne Yelin**, to open-source **PyClifford**, a fast and flexible Python-based Clifford + few T gates simulator.

**“** Thanks to the Unitary Fund microgrant, I've found the perfect platform for open-software development in quantum physics. Not only can I delve deeper into my research, but I can also consider how my work would benefit the larger quantum physics community. - **Hong-Ye Hu, PyClifford** **”**

# 2022 GRANT RECIPIENTS

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**Tim Weaving** and **Alexis Ralli**, to develop **Symmer** into a fully scalable qubit reduction toolkit for the quantum computing community.



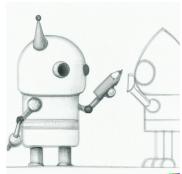
**Paria Naghavi** to add code, visualizations, and conceptual content to the **QIR Book**, to build knowledge bridges for incoming users to the ecosystem.



*"The UF micro grant has empowered the QIR Book project with a community of quantum computing enthusiasts, building tools and content to guide users to embark on their own quantum computing exploration." - **Paria Naghavi, QIR Book***



**Haoxiang Wang** and **Min Li**, to develop **qtrainer**, a high-level [API](#) for variational quantum algorithm (VQA) training with quantum error mitigation.



**Matt Lourens**, to develop **HierarQcal**, a tool to generate quantum convolutional neural network models programmatically.

**Karen Rezkalla** and **Maria Maryam**, two interns joining Unitary Fund, in partnership with QubitxQubit, who helped develop **Metriq's** Python API for quantum benchmarking and increased the database.

# 2022 GRANT RECIPIENTS

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**Ayush Tambde**, to [develop](#) a Higher-Level Oracle Description Language (**HODL**), so that the compiler can interoperate with other frameworks/languages (OpenQASM, QIR).



*The Unitary Fund microgrant provided a platform for me to consult with top experts in the field and enrich my HODL project with their invaluable knowledge. It also enabled me to concentrate on community oriented initiatives, such as documentation, tutorials and blog posts, which expanded the reach of my work to a broader audience of quantum computing professionals.*



- **Ayush Tambde, HODL**



**Steven Thomson**, to create **InsideQuantum**, a new quantum technology themed podcast focusing on the people behind the research, aimed at showcasing a diverse range of voices in order to promote inclusivity and inspire the next generation of quantum technologists.



*Thanks to the support of a Unitary Fund microgrant, we've been able to create a quantum technology podcast that has reached thousands of listeners in over fifty countries. The microgrant program has been crucial to our success, and the ongoing support of the Unitary Fund team has ensured that we are able to maintain a high level of quality and continue to share our guests' stories as widely as possible.* - **Steven Thomson, InsideQuantum**

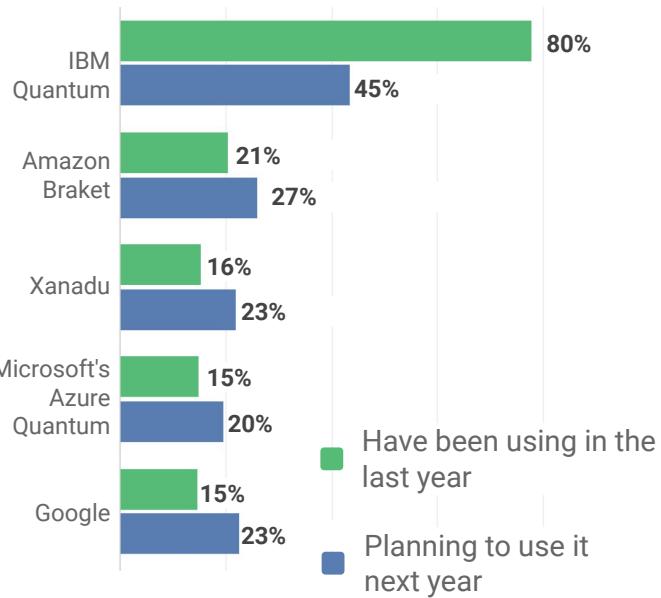


You can find an up-to-date list of UF grants [here](#).

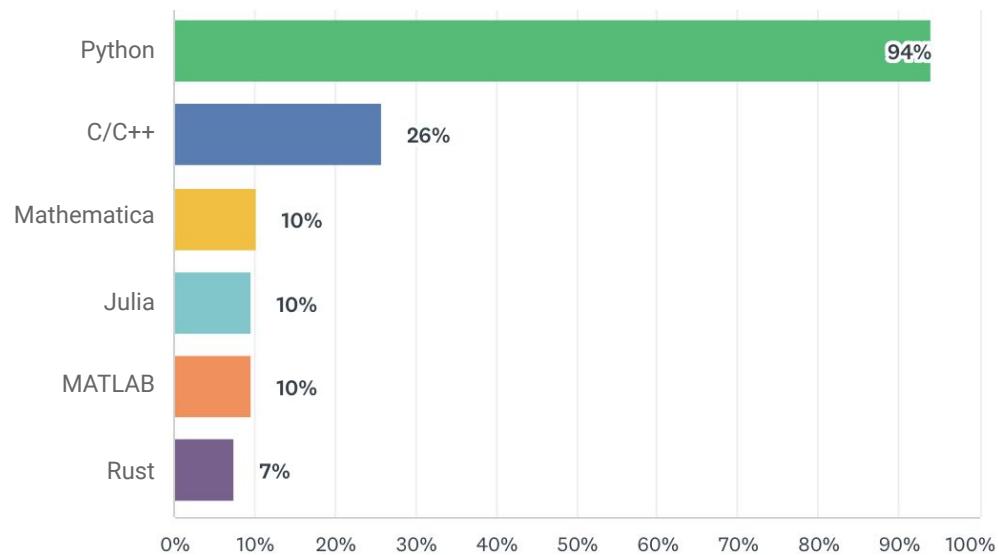
# QOSS SURVEY

In order for institutes, researchers, companies and newcomers to navigate the field more effectively, Unitary Fund created a bottom-up snapshot of everyone who codes with and for quantum computing technologies. With the help of our Advisors, Members, Partners, as well as QOSF, QuantX, and QUE, we launched the **Quantum Open Source Software (QOSS) Survey** in Q3 2022. With **over 1,000 responses** (for the main survey plus the **diversity and inclusion** one), we were overwhelmed by the participation in this first annual survey effort, and look forward to growing this resource in the years to come.

What cloud services do you use or plan to use?



What programming language do you use in developing quantum software?



You can find a [full presentation of the results](#) on our blog, and the [raw data](#) itself on our github.

**Areas of Focus** Demographics; Experience, including: Cloud services; Full-stack development platforms and simulators; Software for applications and tools; OSS Development & Research; Community; Diversity and Inclusion

# UNITARYHACK '22

unitaryHACK is an opportunity for anyone, regardless of background or skillset, to have a chance to contribute to the quantum software ecosystem. Both an entryway into the field, it is also a key mechanism for moving the open source ecosystem forward.

Participant contributions support existing quantum computing projects, and in turn are rewarded with funding, prizes and the opportunity to build critical professional skills like working on OSS or quantum computing stack tools. Each participating quantum open source project has bounties both large and small, giving everyone a chance to grow the ecosystem!

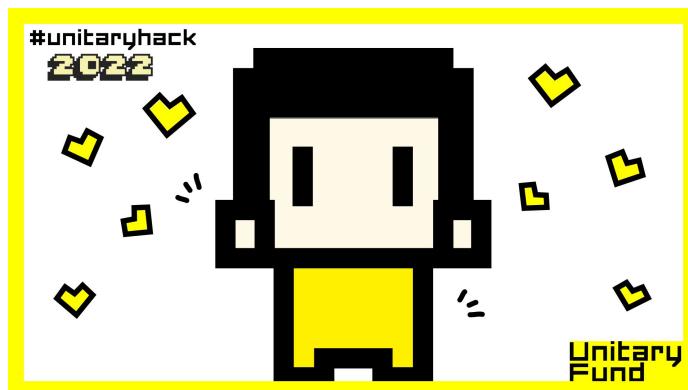
With the help of partners Microsoft Quantum Azure, DoraHacks, and Zapata Computing, as well as our Members, we presented the 2nd annual unitaryHACK over two weeks in June 2022.

Over **73% of participants** were at their **first quantum OSS or OSS event**, and winners spanned **13 countries** (25% USA, 25% India).



*unitaryHACK was a great place to learn and network with members in the quantum community. It was an amazing experience for me! And helped me push some of my first contributions into the quantum open source ecosystem! Thank you unitaryHACK! ❤️*

*- first-time contributor, Maria Gragera Garces*



**440 participants** (19% increase from 2021)

**30 projects** (58% increase from 2021)

**66 bounties** (154% increase from 2021)

**30 paid hackers** (114% increase from 2021)

**45 maintainers**

# COMMUNITY STORIES

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*The micro-grant program has boosted our team with recognition and guidance. Its financial support allows us to share our work with a wider audience at the APS March meeting.*

*- Haoxiang Wang and Min Li, qtrainer*



*With the invaluable support of the Unitary Fund, I was able to take my research to a new level. Their provision of guidance, funding, and access to a fantastic community was instrumental in my progress toward achieving my goals. - Matt Lourens, HierarQcal*



*The best thing about the Unitary grant is that it puts you in a community where everyone is completing a project. Making progress in such an environment becomes easy.*

*- Abdullah Khalid, "A methods-focused QEC guide"*



*The microgrant has made it possible to rent out GPUs to discover quantum codes!*

*- Lev Stambler, Rust decoder for QEC*



# COMMUNITY STORIES

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*We thank the Unitary Fund very much for their support. The grant allowed us to push further QUARC, which was initially only in our To-Do list. The grant motivated us to do even more than was expected since we ended developing an algorithm that substantially reduced the number of ancillae that the final quantum program requires.*

- **Stefanie Muroya Lei and Christoph Kirsch, Quarc (Unicorn framework)**



*Support from the Unitary Fund has allowed us to dedicate the time needed to develop release-grade code for our Symmer project, facilitating efficient implementations of qubit-subspace techniques such as Qubit Tapering and Contextual Subspace. The knock-on effect has been an acceleration in our research, now that we are able to use this tool for the advancement of our work in NISQ algorithms.*

- **Tim Weaving and Alexis Ralli, Symmer**



# SOCIAL UPDATES

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Unitary Fund's digital ecosystem is spread all over the world.

Our Discord server is home to a vibrant and growing community of nearly 2,000 professionals, academics and enthusiasts working and sharing ideas.



**1.7K+**

Linkedin connections



**1.9K+**

Discord members



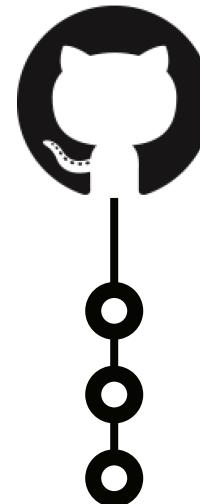
**2.5K**

Twitter followers



**46K**

Youtube impressions



**GITHUB**

**24** Repositories

**137** Contributors

**483** Stars

# TALKS & PRESENTATIONS

The tech staff at Unitary Fund gave talks at various events and host organizations, both online and in person.

The 2022 talks span from research-oriented to community outreach:

## Quantum Wednesdays

This is an informal online meeting held weekly on the Unitary Fund **Discord** server, in the `#community-call` voice channel, that anyone can [join](#). It usually consists of a **journal club** presentation but can span from guest talks on research to social coding hours. You can find them [here](#).

## Quantum Error Mitigation with Mitiq

- **Invited seminars**
  - National Polytechnic Institute of Mexico, Northwestern University, Super.tech, IBM NYC, **Harvard** University ([Slides](#))
- **Conferences**
  - **IEEE Quantum Week**, in the [quantum intermediate representation](#) workshop
  - **SQMS** Annual meeting at Fermilab and **Summer School** in Florence, Italy, including an in-person laboratory session on Mitiq
  - [Quantum Africa Conference](#)
  - QWorld Quantum **Science Days** ([Video](#))

## Other Invited Talks on Unitary Fund's programs

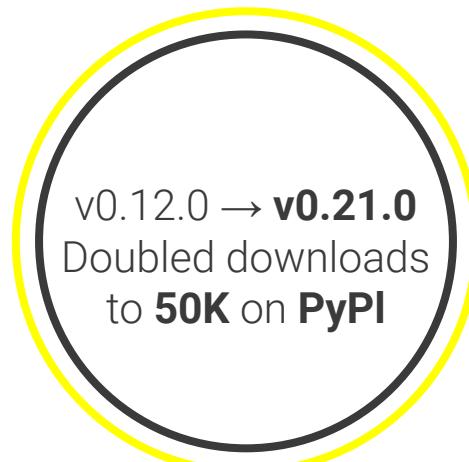
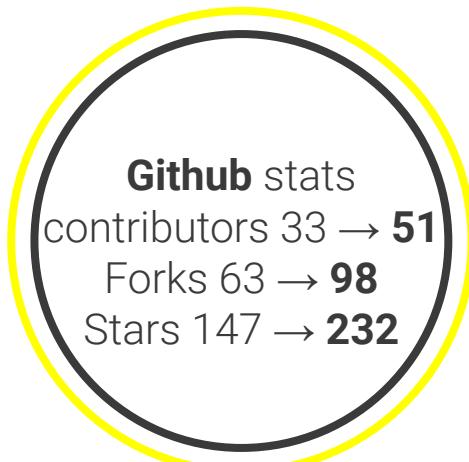
**Womanium** Quantum ([Video](#)), **Funding the Commons** ([Video](#)), Post Quantum Cifris, Q2B Silicon Valley, Tech Forum Campania, QED-C's TAC on Standards and Performance Metrics.



# UF PROJECTS



**Mission:** Make error mitigation easily available to everyone running programs on quantum computers.



## Featured Highlights for the Mitiq project by Quarter in 2022

### Q1

- Overhaul **documentation** and display of notebooks (20 [examples](#))
- Three students from Stanford CS59SI course intern at UF: [quantum volume](#) circuits are added.
- Add **GHZ circuit** support for benchmarking

### Q2

- Bug fixes!
- Implement **dynamical decoupling** at the digital level ([blog](#)).
- Add first functionality of **learning-based PEC**

### Q3

- Prototype **readout error mitigation** (REM)
- Add **support** for the latest versions of Qiskit, Cirq, and Pyquil.
- In-person Summer School @ GGI Florence with Mitiq **labs**

### Q4

- Add **identity insertion** as a noise-scaling technique for ZNE
- Fully support **learning-based PEC**
- Integrate Mitiq's error mitigation with [BQSKit](#)'s compilation

# UF PROJECTS

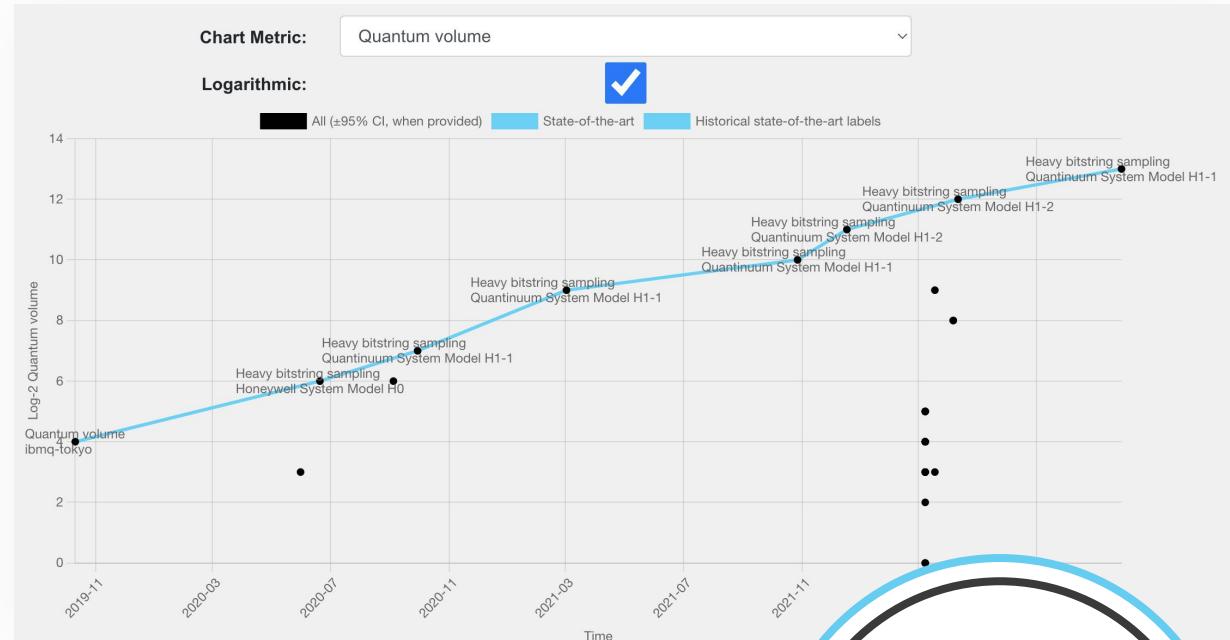


How does quantum computing Platform X running software stack Y perform on workload Z and how has that changed over time?

Unitary Fund was thrilled to introduce **Metriq** this year: a free and open source platform that helps anyone better answer this question for themselves.

Metriq accelerates research by upgrading the taxonomy of reported results that are often now locked away in tables of review papers. By making the data explorable and live-updated we'll be able to make better progress together to develop quantum technology.

Researchers and developers in academia and industry can submit results on existing benchmarks or propose new benchmarking tasks to the community. All results include sources, are openly accessible and it is free to sign up and start contributing!



**289** tracked  
methods  
**147** tasks  
**144** platforms  
**363** total  
submissions

# UF RESEARCH

Unitary Fund believes that research is important for quantum open source. We focus not only on our own research interests but also on building tools to enable others, like those in our microgrant program. We continue to perform research with open source software in quantum technology. Unitary Fund acknowledges support from the DoE ARQC framework, within the TEAM project (Tough Errors Are no Match). Here is a list of papers published or made publicly available in 2022 with work performed by the **Unitary Labs** team, Unitary Fund's technical staff, with collaborators from several organizations:

Quantum Error Mitigation research with Mitiq:

**Automated quantum error mitigation based on probabilistic error reduction.** B. McDonough, et al. *CQI Conference 2022*, [2210.08611](#).

**Testing platform-independent quantum error mitigation on noisy quantum computers.** V. Russo, A. Mari, N. Shammah, R. LaRose, W. J. Zeng [2210.07194](#).

**Error mitigation increases the effective quantum volume of quantum computers.** R. LaRose, A. Mari, V. Russo, D. Strano, W. J. Zeng, [2203.05489](#)

**Impact of time-correlated noise on zero-noise extrapolation.** K. Schultz, R. LaRose, A. Mari, G. Quiroz, N. Shammah, B. D. Clader, W. J. Zeng, *Phys. Rev. A* **106**, 052406 (2022), [2201.11792](#).

**Mitiq: A software package for error mitigation on noisy quantum computers.** R. LaRose, et al., *Quantum* **6**, 774 (2022), [2009.04417](#)

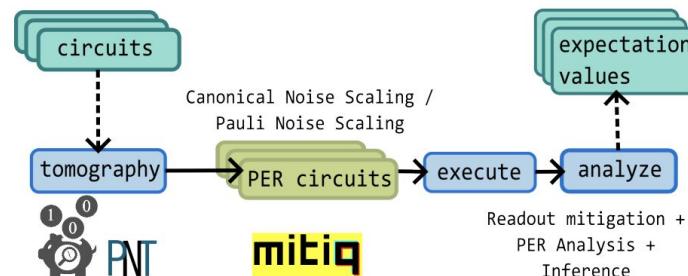


Figure from [2210.08611](#), introducing a workflow to reduce resources for PEC, using Mitiq and other tools in the open-source quantum toolchain, such as pyGSTi

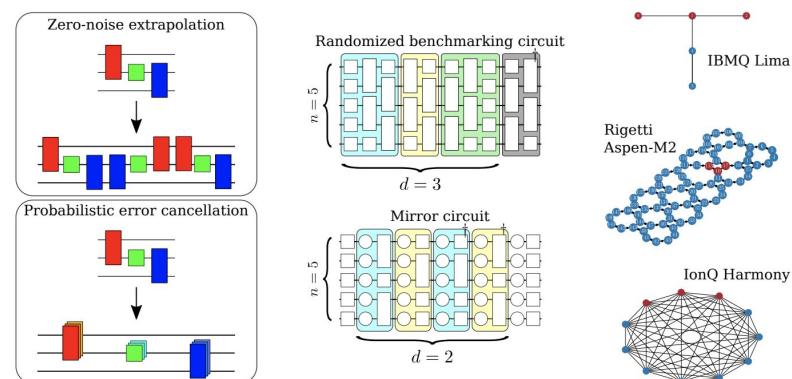


Figure from [2210.07194](#). Mitiq is used as an out-of-the-box toolkit to benchmark quantum error mitigation techniques (ZNE and PEC), running standard workloads on three quantum computers (IBM, Rigetti, IonQ)

# UF RESEARCH

The **Unitary Labs** team in 2022 performed research with collaborators beyond quantum error mitigation in quantum:

**Arkhipov's theorem, graph minors, and linear system nonlocal games.** C. Paddock, V. Russo, T. Silverthorne, W. Slofstra, [2205.04645](#)

**Diagnosing quantum chaos with out-of-time-ordered-correlator quasiprobability in the kicked-top model.** J. R. González Alonso, N. Shammah, S. Ahmed, F. Nori, J. Dressel, [2201.08175](#)

**Pulse-level noisy quantum circuits with QuTiP.** B. Li, et al., *Quantum* **6**, 630 (2022), [2105.09902](#)

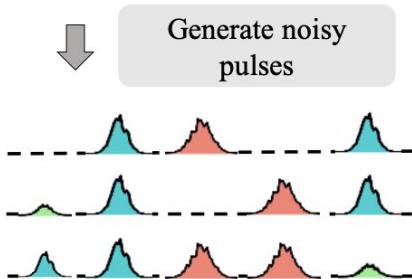


Figure excerpt from [2105.09902](#), illustrating the simulation of pulse noise in the compilation of the Deutsch Jozsa algorithm

**Pulser: An open-source package for the design of pulse sequences in programmable neutral-atom arrays.** H. Silvério, S. Grijalva, et al. *Quantum* **6**, 629 (2022), [2104.15044](#)

A list of 2022 papers from **projects** recipients of **UF grants**, demonstrate the impact of the microgrant program:

**Lattice Surgery Compiler (LSC): A High Performance Compiler for Very Large Scale Surface Code Computations.** G. Watkins et al., [2302.02459](#)

**qLEET: Visualizing Loss Landscapes, Expressibility, Entangling Power and Training Trajectories for Parameterized Quantum Circuits.** U. Azad and A. Sinha, [2205.02095](#)

**Quantum Games and Interactive Tools for Quantum Technologies Outreach and Education,** Z. C. Seskir, P. Migdał, et al., [2202.07756](#)

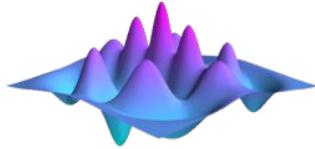
**An Extension Of Combinatorial Contextuality For Cognitive Protocols.** A. Karim Obeid, et al. [2202.08209](#)

**Virtual Lab by Quantum Flytrap: Interactive simulation of quantum mechanics.** K. Jankiewicz , P. Migdal , and P. Grabarz, [doi:10.1145/3491101.3519885](#)

**The ALF (Algorithms for Lattice Fermions) project release 2.0. Documentation for the auxiliary-field quantum Monte Carlo code.** F. F. Assaad, et al. *SciPost Phys. Codebases* **1** (2022) [scipost.org/SciPostPhysCodeb.1](#)

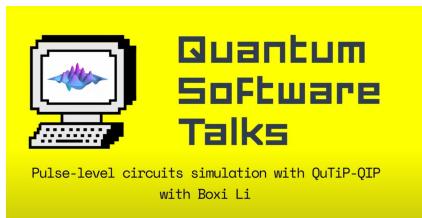
# SUPPORTED PROJECTS

Unitary Fund supports projects not only from within but also to other external organizations that supports in the advancement of the quantum ecosystem.



## QuTiP

- QuTiP reached the milestone of 1M downloads in 2022!
- Admins presented [interactive Jupyter Book tutorials](#) at Quantum Africa Summer School in Kigali, Rwanda
- Three students in Google Summer of Code program (with NumFOCUS). Videos [here](#). Link to blogs:
  - Christian Staufenbiel worked on [QuTiP notebook CI testing and v5 update](#)
  - Xavier Spronken worked on [QuTiP benchmarks](#)
  - Shreyas Pradhan worked on a [QuTiP-QIP backend for Qiskit](#)
- Released QuTiP v4.7.1, and QuTiP-QIP 0.2.3
- Released new live benchmarks and tutorials pages
- Guest UF [blog post](#): "Implementing VQAs in QuTiP"



Pulse-level circuits simulation with QuTiP-QIP with Boxi Li

- Boxi Li gave a talk on QuTiP QIP on Unitary Fund's Quantum Software Talk Series.

## BraKetVue

- BraKetVue team produced a new publication on the project in Optical Engineering: P. Migdał, K. Jankiewicz, P. Grabarz, et al. "*Visualizing quantum mechanics in an interactive simulation - Virtual Lab by Quantum Flytrap*", [Optical Engineering 61, 081808 \(2022\)](#)



## Qrack

- **Qrack:** The Quantum Insider ranked Qrack as #5 best QC simulators for 2022, in a [list of the top 63](#).
- Officially joined Unitary Fund GitHub in 2022.
- Launched API v8 and achieved HPC distribution scaling to at least 8 GPUs in a node.

# SUPPORTED PROJECTS

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insideQuantum

- **insideQuantum**, the podcast telling human stories behind quantum technologies, completed [Season 1](#) with 12 episodes, covering machine learning, quantum information theory, near-term quantum computing and much more with academics, experimenters and entrepreneurs.

*Algorithms  
Lattice  
Fermions*

ALF Project

- The **ALF** project provides general code for the finite-temperature and projective auxiliary-field quantum Monte Carlo algorithm. In 2022 it added modularity, HDF5 support, and new installation scripts.
- [PyALF](#) is the Python integration for ALF, with Jupyter notebooks.
- You can join the ALF collaboration on [Discord](#)



Open Quantum Systems in Python

- **OQuPy** is a Python toolkit that allows one to efficiently compute the dynamics of quantum systems that are strongly coupled to structured environments. Dominic and Geral provided an overview of the project in a [guest blog post](#) on the UF website.

**QWORLD**

- **QWorld** organized the Quantum Science Events Days Conference with more than 700 participants.
- QWorld conducted a fully-online [graduate-level pilot QCourse](#) on “Projects in Quantum”, supported by Unitary Fund.
- QSpring2022 started with several local [workshops](#) conducted by around 20 QCousins.

**WE ARE  
UNITARY FUND**

# THE TEAM

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**WILLIAM ZENG, PHD**

President



**NATHAN SHAMMAH, PHD**

Chief Technology Officer



**BEN CASTANON**

Chief of Staff



**ANDREA MARI, PHD**

Technical Staff



**MISTY WAHL**

Technical Staff



**NATE STEMEN**

Technical Staff



**DAN STRANO**

Technical Staff



**VINCENT RUSSO, PHD**

Technical Staff



**FRANCES POBLETE**

Marketing & Design

# BOARD MEMBERS

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## WILLIAM ZENG, PHD

President. Head of Quantum Research at Goldman Sachs. Fmr. product/sw lead at Rigetti. Oxford quantum algorithms PhD.



## NATHAN SHAMMAH, PHD

CTO and Head of the Technical Staff. QuTiP admin. PhD in Physics from Univ. of Southampton.



## TRAVIS SCHOLTEN, PHD

Secretary. Quantum Applications Architect at IBM Quantum and Policy Hackers Fellow at the Lincoln Network. PhD in quantum computing from the University of New Mexico (2018).



## CHRISTOPHE JURCZAK, PHD

Treasurer. Co-founder and managing partner at Quantonation. PhD in Quantum Physics from Ecole Polytechnique.

# INDIVIDUAL SUPPORTERS

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Thanks to the continued support of our individual supporters!

John Hering

Jeff Cordova

Nima Alidoust

Travis Humble

George Umbrarescu

Greg Ramsay

Peter Johnson

Jens Koch

Guillaume Verdon

Rishi Sreedhar

Travis L. Scholten

Amir Ebrahimi

Christophe Jurczak

Will Zeng



*I imagine that years from now, some of the biggest contributors in quantum computing will have come through the Unitary Fund program. The grants provide avenues for creative, motivated folks to meaningfully contribute to this new industry. Awardees are using the program to launch their careers in quantum computing, landing jobs at Zapata and elsewhere. - Peter Johnson, Co-Founder, Zapata Computing*



# ADVISORY BOARD

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Thanks to the [\*\*Advisory Board\*\*](#) for volunteering to review grant applications and mentor winners!

Amira Abbas (**new advisor!**)

Shahnawaz Ahmed

Tomas Babej

Ntwali Bashige

Amy Brown

Stephen DiAdamo (**new advisor!**)

Mark Fingerhuth

Cassandra Granade

Josh Izaac

Sonika Johri (**new advisor!**)

Sarah Kaiser

Peter Karalekas

Nathan Killoran

Ryan LaRose

Roger Luo

Alex McCaskey

Travis L. Scholten

Dylan Sim

Michał Stęchły

Christa Zoufal



*Our support of the Unitary Fund enables continued growth of the quantum computing ecosystem. It is an opportunity to connect with and help quantum developers from a diverse range of skill sets and backgrounds.*

*- Travis L. Scholten, IBM Quantum*



The advisory board met on a regular basis since 2020 in over **50 grant review meetings**.

# UF AMBASSADORS

The Unitary Fund Quantum Ambassadors Program recognizes individuals that are directly addressing the challenges of the growing quantum community. It brings people together to learn new skills, develop open source tools, and build the open quantum community all over the world. Our ambassadors are model citizens of the quantum open source ecosystem, contributing in more ways than code to help grow the community. In Q4, we announced the list of ambassadors that will be helping us in 2023.



**ALBERTO MALDONADO ROMO**

PhD student at the Instituto Politécnico Nacional



Community enthusiast and coordinator, Alberto joined the Unitary Fund Discord and has been a maintainer for the quantum universal education project during unitaryHACK.



**NICK GARDNER**

PhD student at Stanford University



While attending Stanford's CS 59SI course on open-source quantum computing, Nick joined Mitiq's open community calls and has since become a regular contributor. Read more [here](#).



**AMIR EBRAHIMI**

Photonic Inc. and Masters student at UT Austin



Amir proposed a "request for comments" document introducing a full-fledged technique for Mitiq, readout error mitigation by confusion matrix inversion. Amir has since joined the quantum industry.



**RAHUL MISTRI**

Software Development Engineer at Amazon Web Services



Rahul contributed to Mitiq by improving the benchmark module and the Mitiq documentation and has collaborated on various pull requests during milestones with the UF technical staff.

Read more about the ambassadors at [https://unitary.fund/posts/2022\\_ambassadors.html](https://unitary.fund/posts/2022_ambassadors.html).

# **FINANCIALS**

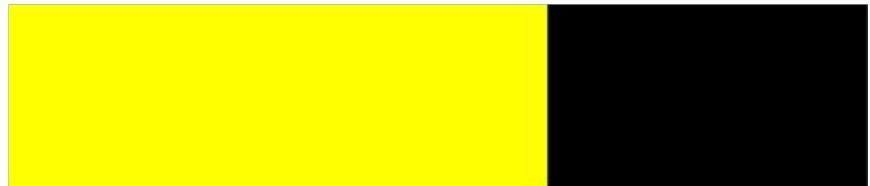
# FINANCIAL FORECAST

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## Revenue

We forecast about \$ 830K revenue in 2022.

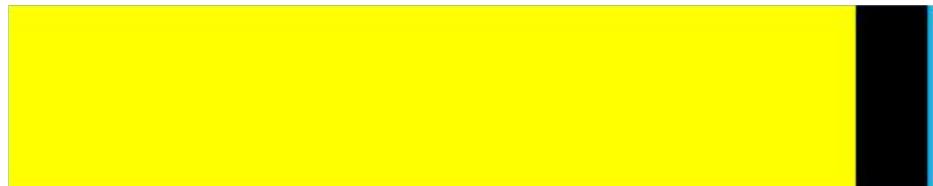
- Unitary Labs Grants \$ 523,963
- Membership & Donations \$ 311,248



## Expenditures

We forecast about \$ 899K expenditures in 2022.

- Unitary Labs \$ 823,494
- Microgrants & Bounties \$ 69,795
- Community Support and Events \$ 6,303



```

from mitiq import zne
circuit = benchmarking.Circuit(n_qubits=1)
print(circuit) print(circuit)
0:—Y—X—X^0—Y—X— 0:—Y—X—
from mitiq import zne from mitiq import zne
mitigated_result = zne.execute_with_zne(circuit, execute)
from mitiq import ddd from mitiq import ddd from mitiq import ddd
from mitiq.benchmarks.ghz_circuits import generate_ghz_circuit from mitiq.benchmarks.ghz_circuits
from mitiq.cdr import generate_training_circuits from mitiq.cdr import generate_training_circuits
from mitiq.pec import execute_with_pec from mitiq.pec import execute_with_pec from mitiq.pec import execute_with_pec
from mitiq import MeasurementResult from mitiq import MeasurementResult from mitiq import MeasurementResult
from mitiq.rem import post_select from mitiq.rem import post_select from mitiq.rem import post_select
from mitiq.calibration import Calibrator, ZNESettings, execute_with_mitigation from mitiq.calibration import Calibrator
from mitiq import benchmarks from mitiq import benchmarks from mitiq import benchmarks from mitiq import benchmarks
circuit = benchmarks.generate_rb_circuits(n_qubits=1, num_cliffords=2, return_type = frontend, ) [0] circuit = benchmarks.generate_rb_circuits(n_qubits=1, num_cliffords=2, return_type = frontend, )
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from mitiq.cdr import generate_training_circuits from mitiq.cdr import generate_training_circuits from mitiq.cdr import generate_training_circuits from mitiq.cdr import generate_training_circuits

```

# Unitary Fund

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