



# Team Q-Harmonics

## Team Members

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## Project

### DQFT

Distributed Quantum Fourier Transformation



**Qiskit**



**Quantum  
Network Explorer**  
By QuTech



PENNYLANE

Implementation, Validation, Benchmarking, Documentation

GitHub

<https://github.com/brunorijsman/quantum-internet-hackathon-2022>

# How did we do it?

## DQFT circuit generation

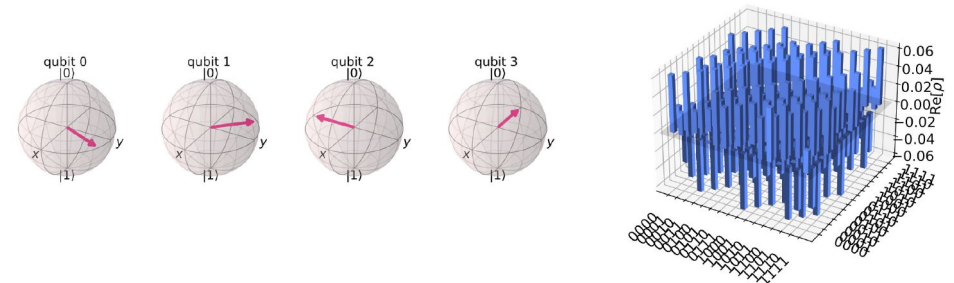
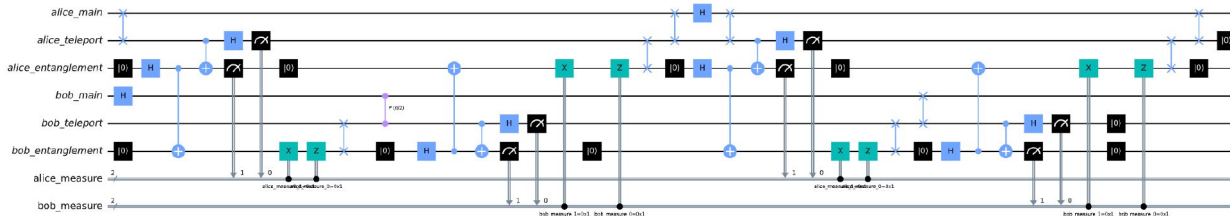
- Python classes and scripts
- Cluster and processor abstractions
- Teleportation and cat state abstractions
- QFT and DQFT algorithms

## DQFT circuit validation

- Python classes and scripts
- Use states and counts from simulator
- Compare histograms
- Compare state vectors
- Compare density matrices

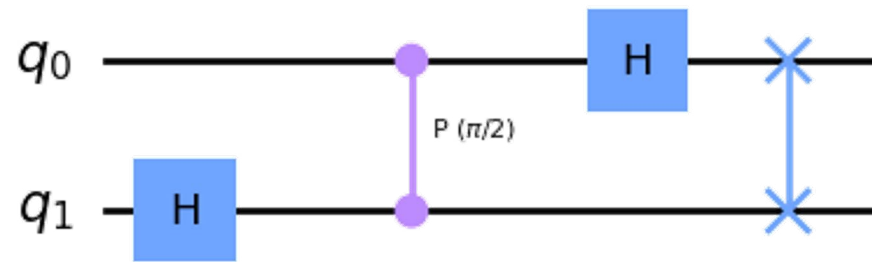
## DQFT execution and visualization

Jupyter notebooks 

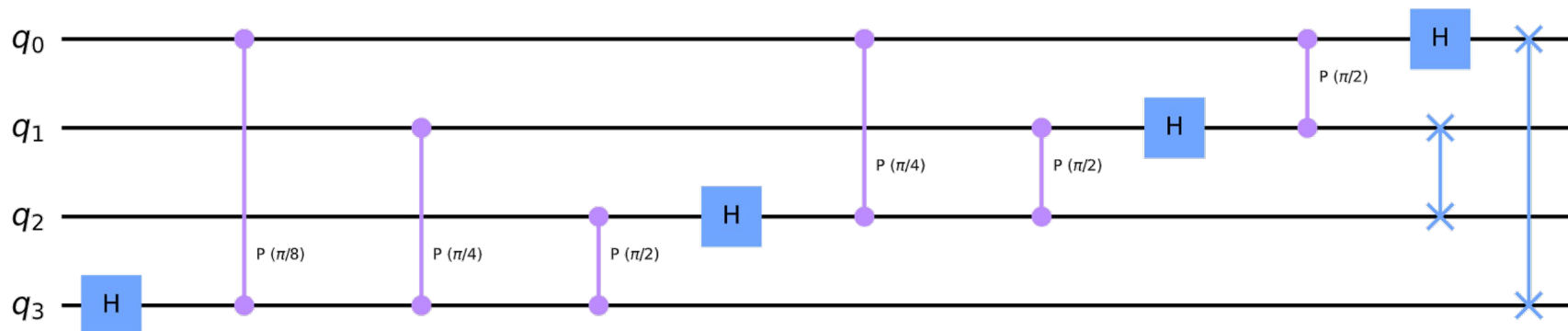


# Some example non-distributed QFT circuits

## 2-qubit non-distributed QFT

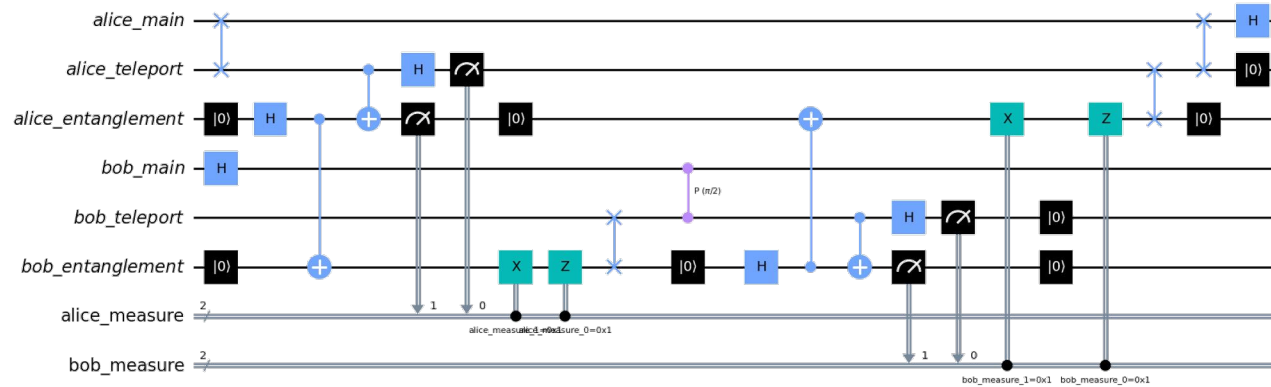


## 4-qubit non-distributed QFT

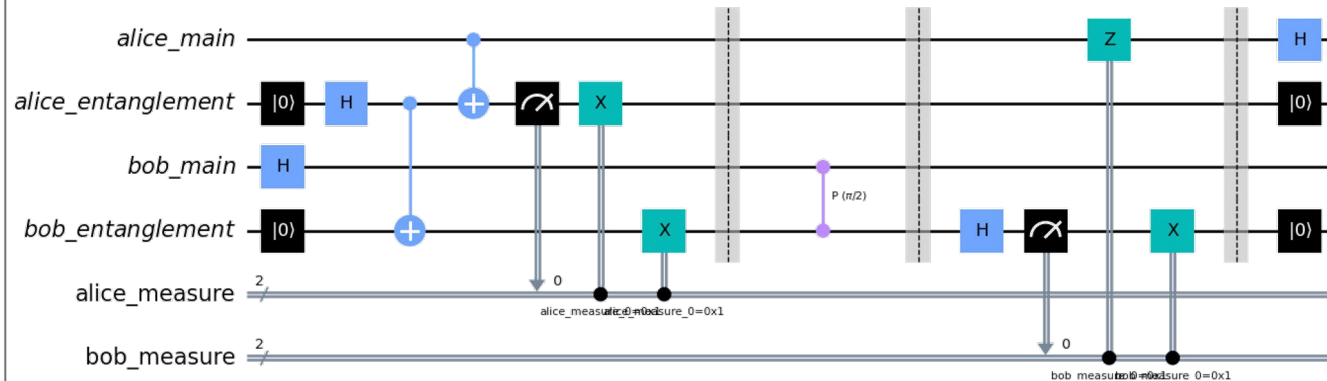


# Some example distributed QFT circuits













## 2-qubit distributed QFT using teleportation



## 2-qubit distributed QFT using cat states



# How far did we get?

	 <b>Qiskit</b>	 <b>Quantum Network Explorer</b> By QuTech	 <b>PENNYLANE</b>
Non-distributed QFT			
Distributed QFT using teleportation			
Distributed QFT using cat-states			
Validation using histograms			
Validation using state vector / DM			
Documentation and visualization	