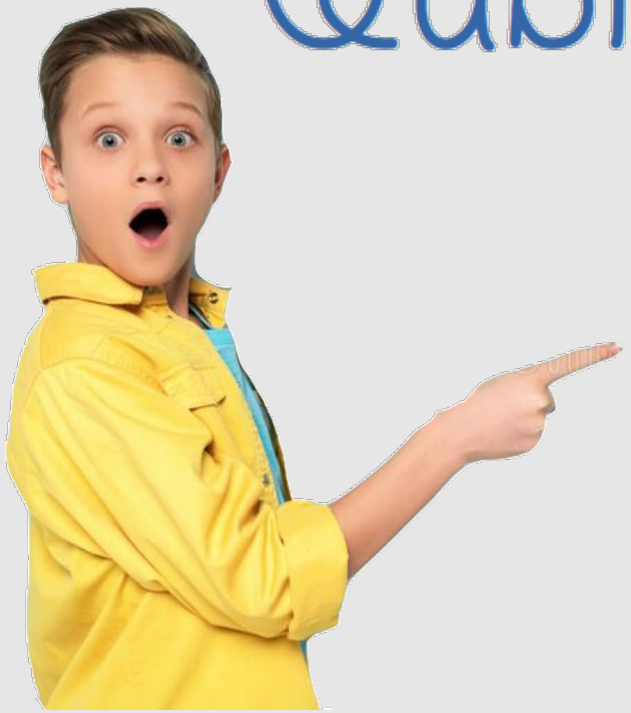
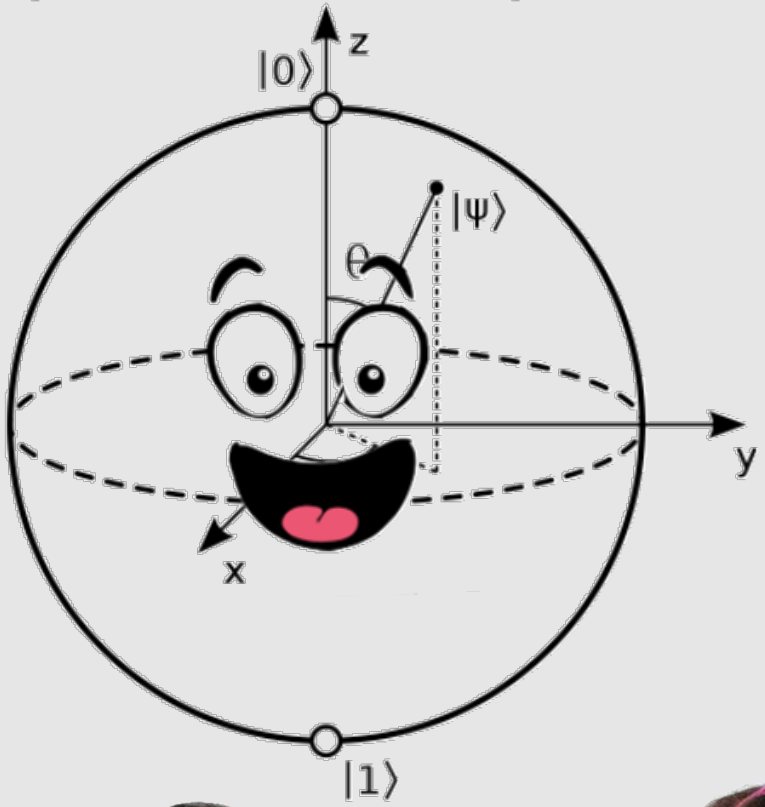
Qubits for the kids





The QFTK team

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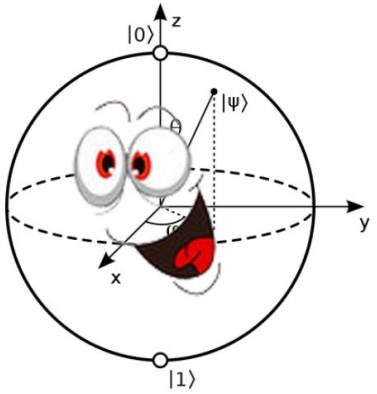
María Gragera Garcés
Vesna Manojlovic

QIH
Quantum Internet Hackathon 2022

Sustainability

- Ecological impacts
  - materials
  - energy consumption
  - recycling
- Social, ethical and legal impacts



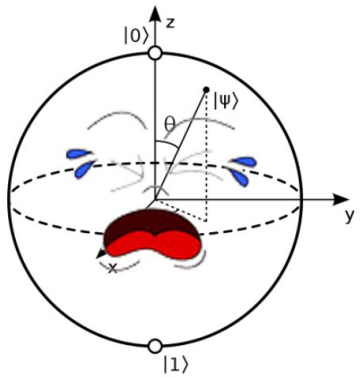
Quantum internet

Hardware:

- Quantum computers
- Quantum key distribution systems
- Quantum repeaters / routers

Network:

- Congestion & Delay
- Processing within control plane
- Synchronization



The PMMMF framework

Power Density

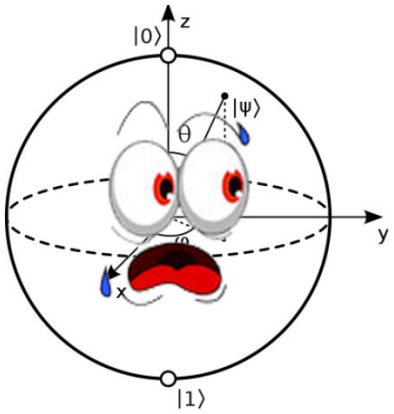
Materials

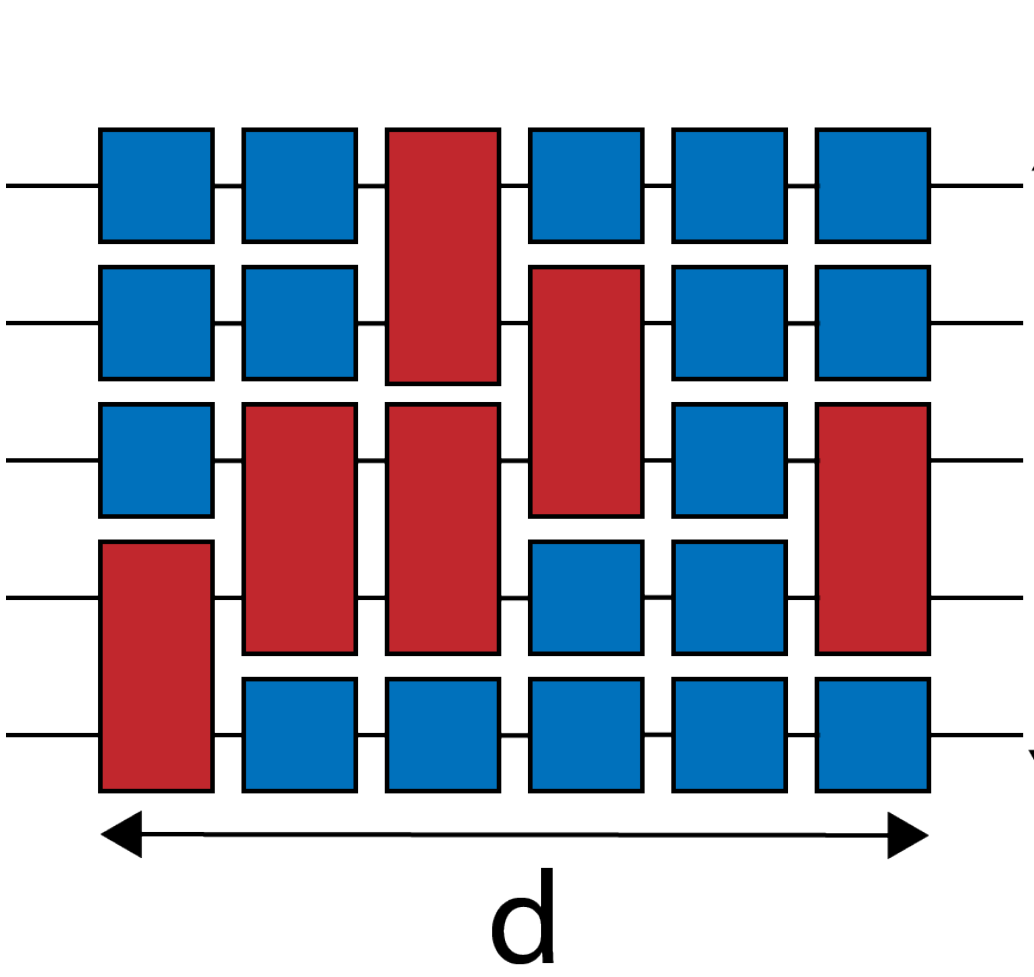
Maintenance

Modularity

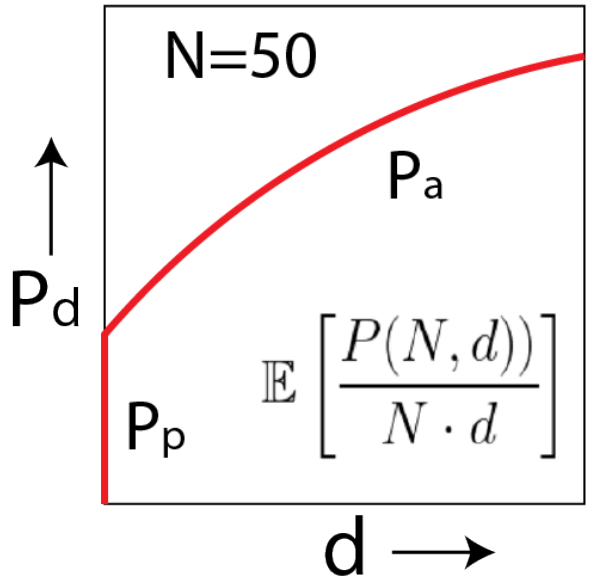
Form Factor

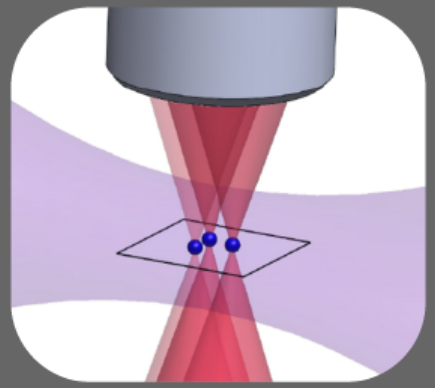
Quantum Computation Power Density





$$\in \{g_i\}_{i=1}^{M}$$



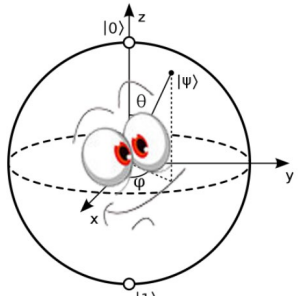


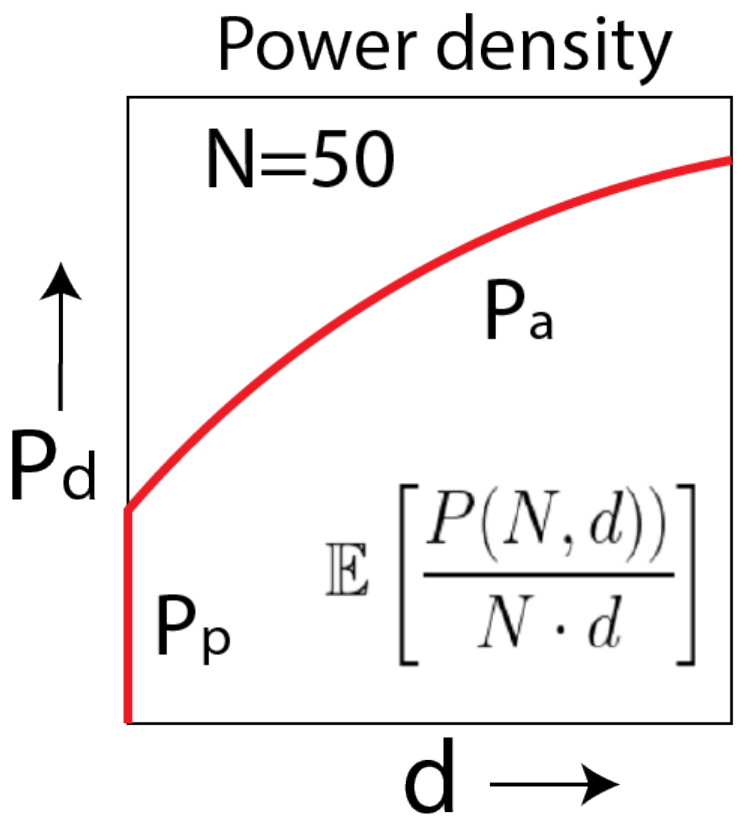
Rydberg Atom System

Power Efficient & Modular

B

- ☐ Alkali / Alkaline-Earth
- ☐ Laser Optical Tweezers
- ☐ High-Fidelity
- ☐ Room Temperature

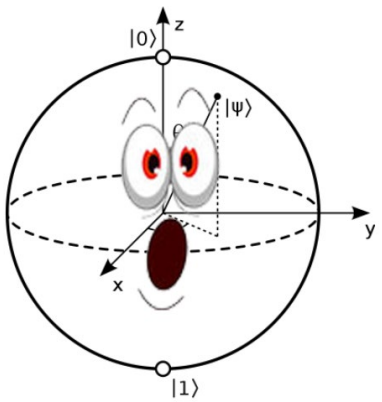




P
M
M
M
F

A
B
C
A
B

PMMMF System of QC sustainability



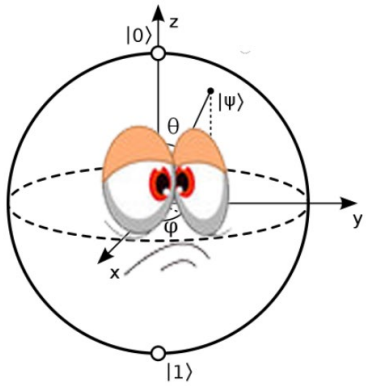
	Ry	Ion	Sc	Ph	NV	QD
P	A	B	C	B	B	B
M	B	B	B	B	A	B
M	B	B	B	C	B	A
M	B	C	B	A	B	B
F	C	C	C	B	A	A

Quantum Key Distribution Networks

Vast amount of different technologies

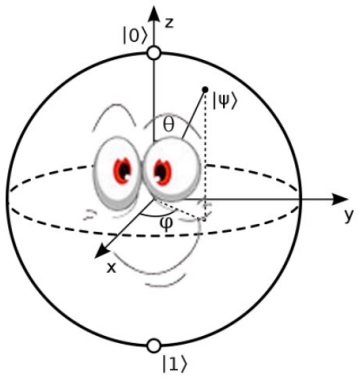
- Define classes of systems that can be compared
- Possible metric:

  secret key rate vs. power consumption on pre-defined distance



Conclusion

- Standardization: Factors that influence sustainability
- Early consideration of the environmental and social impacts of the hardware



THANK YOU TO THE QIH TEAM

As a team we would like to acknowledge RIPE community, the QIH organizers and our employers, for the opportunity to create this body of work.