www.quantum-energy-initiative.org

#QEI

the quantum energy initiative

Network of scientists & engineers launching ***research*** programs
on ***energy footprint*** (& environmental footprint) of quantum technologies

Robert S. Whitney
Université Grenoble Alpes & CNRS

PushQuantum ***QEI Munich*** Event - 5 July 2024

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quantum computer

it’s all about

Noise

versus

RESOURCES

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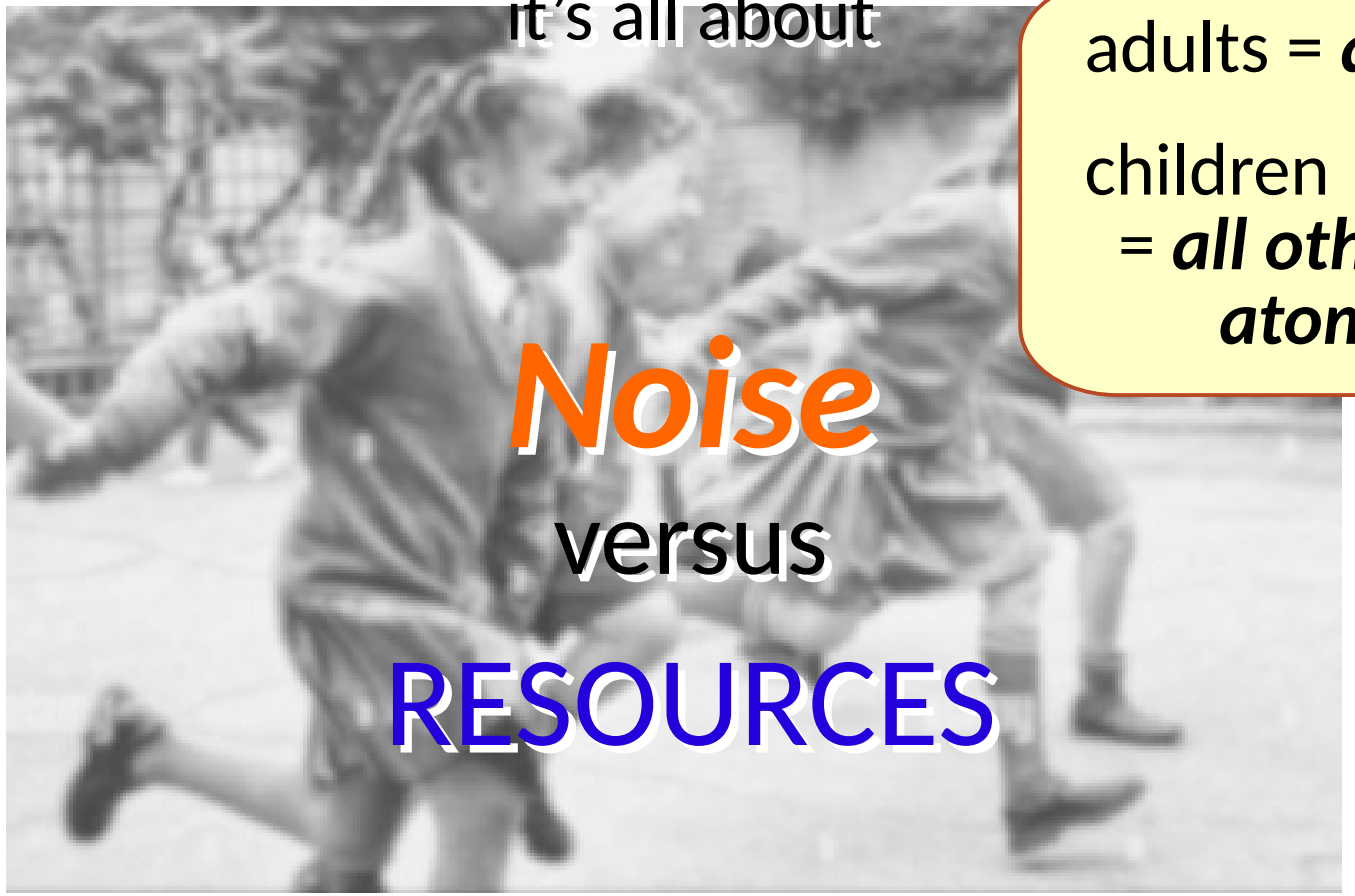
quantum computer

don't think of a computer

think of
serious discussion
between parents
in a
childrens' play area

it's all about



Noise

versus

RESOURCES

adults = ***qubits***

children
= ***all other atoms, etc***

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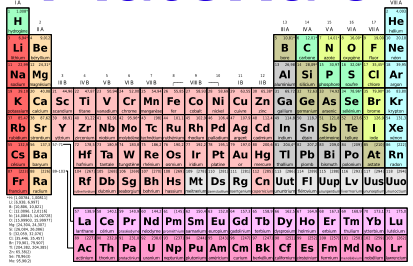
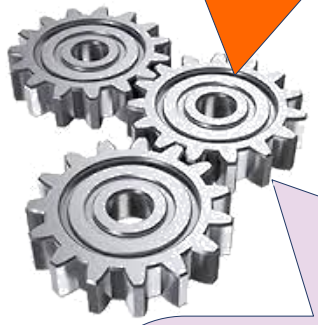
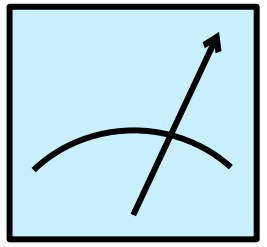
Noise/imperfections

Materials



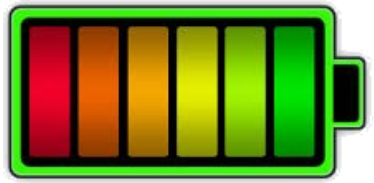
Machine





Target performance

Energy



RESOURCES

Science → understand *noise & resources*

Technology → increase performance & reduce resources

Society → what applications for given resources

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Where are we now with quantum computing?

An ***analogy*** with ***flight***

Noise means 1 error every 200 gate operations

For certain applications, if **noise** is eliminated

quantum computing

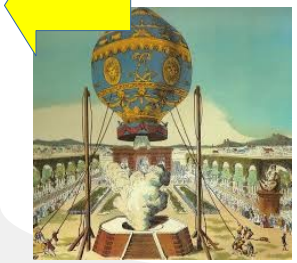
1-2 bad qubits

1000 bad qubits or 1-2 good qubits

???

1960-70s 2000s 2010s **now** ***future!***

classical computing



*quantum-**inspired** classical computing*

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Quantum technologies: energy hog or energy advantage?

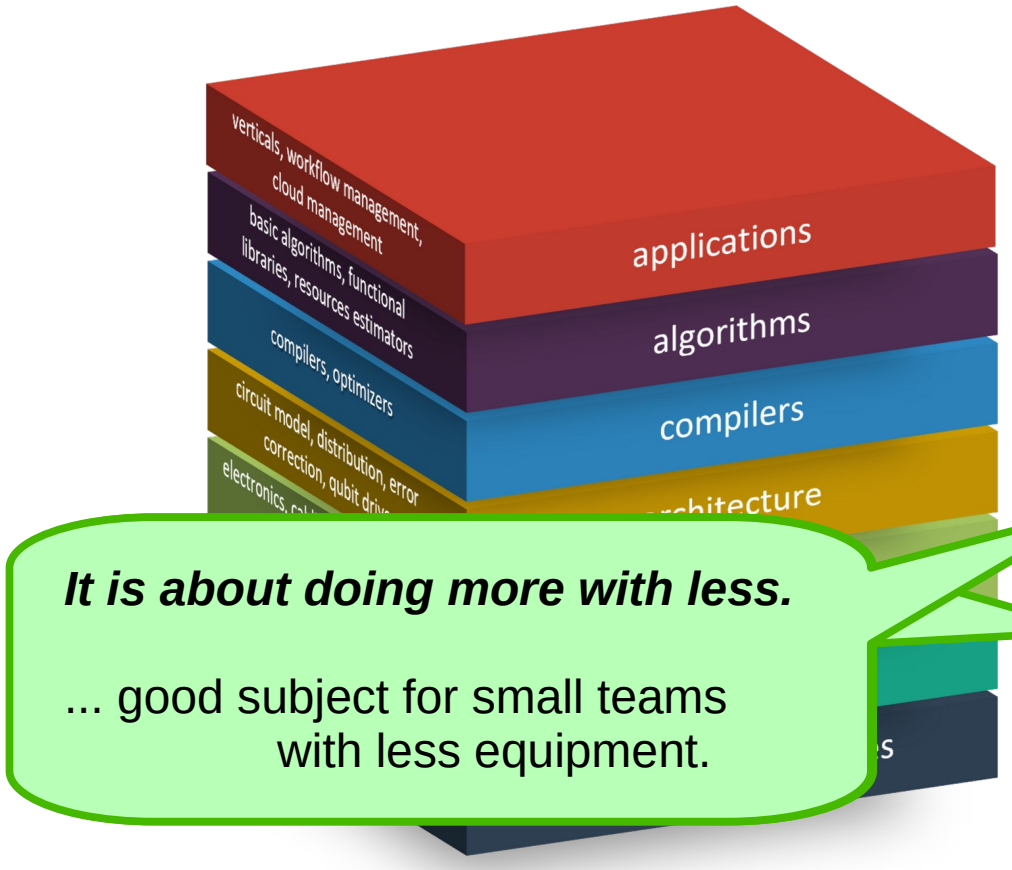
We do not know yet … & quantum hype does not help!

Need for new methodologies

- understand & optimize
  the cost of ”full-stack”
- objective figures of merit
- innovation with
  finite resources NOW!

Need to build interdisciplinary community …

develop common language & tools



Computer science
error correction,
algorithmics
compilers…

Quantum energetics,
thermodynamics,
control

Enabling technologies:
cryogenics, lasers,
microwaves…

It is about doing more with less.

… good subject for small teams
with less equipment.

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Join the QEI community!

QEI Seminar - Yasser Omar

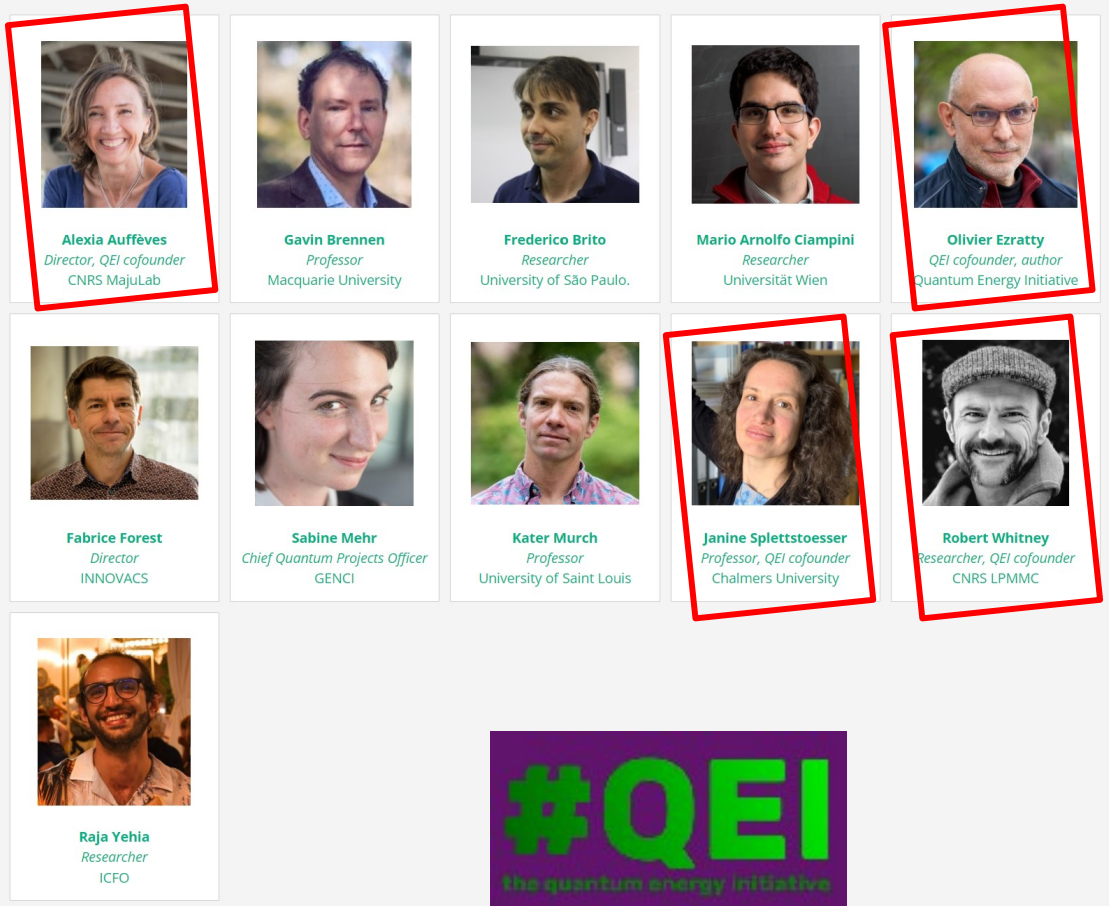
32 vues • il y a 1 jour

QEI Seminar - Marco Fellous-Asiani

203 vues • il y a 4 mois

_The people who do the work ! _

The governance of the Quantum Energy Initiative is built around the **QEI board**. It is representative of the diversity of the QEI topics, skills and countries. It was created in January 2023 and contains also the co-founders who launched the QEI in August 2022.



- **Bottom up** initiative
- Building a community for open science, research & development
- Community mapping and self-organizing

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WORKSHOP 2025
6-10 Jan Grenoble

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First industrial partners

research

Paris Centre for Quantum Technologies

Quantum Information Center
ALLIANCE SORBONNE UNIVERSITÉ

MajuLab

CQT Centre for Quantum Technologies
National University of Singapore

WACQT Wallenberg Centre for Quantum Technology

QuantAlps

industry

Microsoft

parityqc

aQuantum Software Engineering

EVIDEN an atos business

IQM

BTQ

KILIMANJARO QUANTUM TECH

KIPU QUANTUM

PASQAL

quobly

ALICE & BOB

QUANDELA

QUANTUM BRILLIANCE

C12 Quantum

ATEM CUSTOMIZED CONNECTIVITY

Radiall

Qnami the quantum wave

Vigthor

HPC and cloud service providers

FRANCE HYBRID HPCQUANTUM INITIATIVE

OVHcloud

CSC

ecosystem

llq

QUANTO NATION

Systematic
Paris Region Deep Tech Ecosystem

COMMUNITY of SCIENTISTS & ENGINEERS

producing

HIGH-QUALITY *QUANTITATIVE* INFORMATION

encouraged by

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DECISIONS for SOCIETY (stakeholders, social scientists, etc)

- **How do we judge when something is worth the resources / environmental cost?**
- **Balancing security argument versus open knowledge for quantum technologies ?**
- **New rules** (laws, voluntary codes, etc) **to avoid abuse of quantum technology?**
- **Blind spots of quantum scientists/engineers** (things we have not even considered) **?**

Currently this community's political role is limited to saying these issues are important

- with individual members obviously having individual political roles as citizens

Is this right or wrong for long term?

- Should quantum scientists/engineers decide?

No, definitely not us alone!

- Should market economics decide?
- Should military decide?
- Should governments decide? *HOW?*