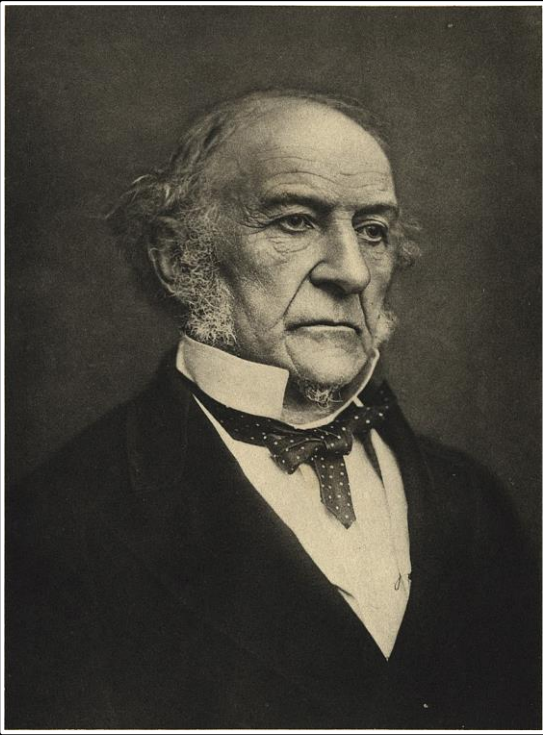
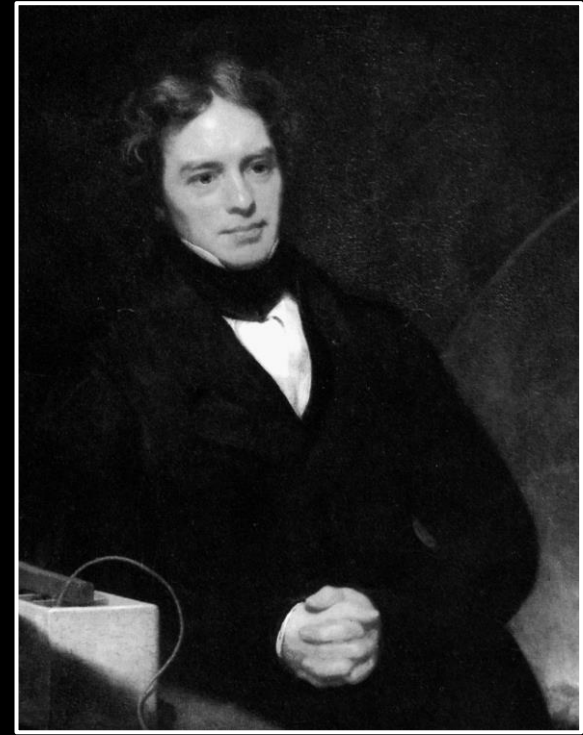
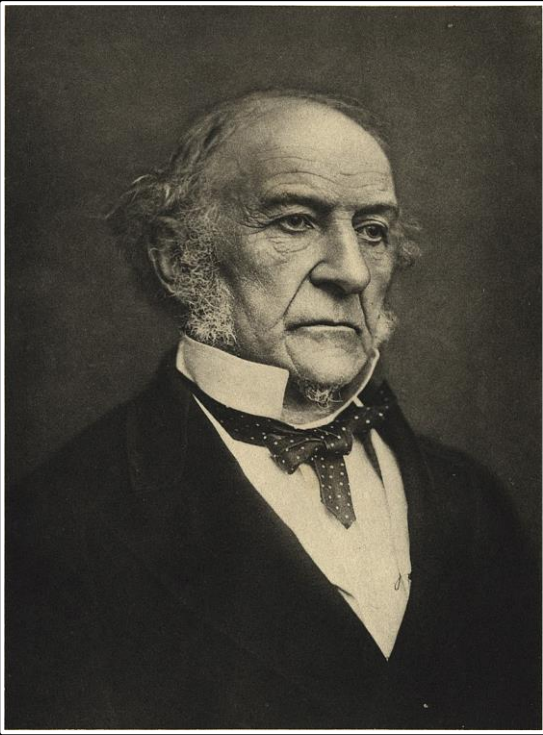


# QUANTUM ECONOMY

**USEFULNESS OF USELESS**



William Gladstone: „*What is the practical value of electricity?*“



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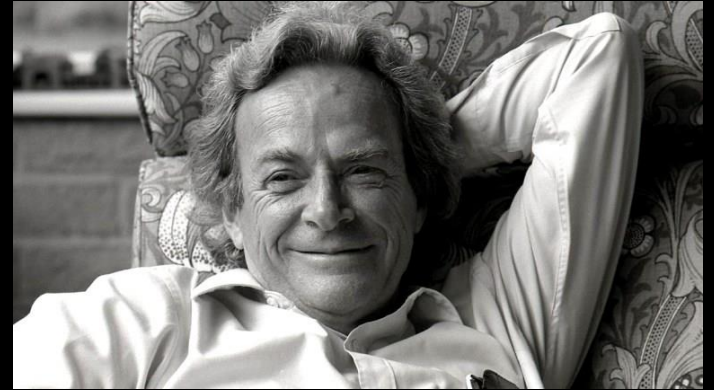
Michael Faraday: „*I do not know, but I am sure one day, sir, you may tax it.*“

# MIT Endicott House 1981



# Quantum computers? 1981

“...trying to find a computer simulation of physics, seems to me to be an excellent program to follow out...and I'm not happy with all the analyses that go with just the classical theory, because 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.”



Richard Feynman



**We are all agreed that your theory is crazy. The question that divides us is whether it is crazy enough to have a chance of being correct.**

Niels Bohr

# Quantum timeline

**1981** – idea of quantum computer

**1983** – idea of quantum cryptography – BB84

**1985** – concept of universal quantum machine/computer

**1989** – experimental implementation of quantum cryptography – BB84

**1991** – idea of entanglement-based quantum cryptography – Ekert91

**1994** – Shor's algorithm – factorization as a P problem

**1997** – experimental implementation of quantum teleportation

**2000** – experimental implementation of Ekert91 protocol

**2016** – “quantum” satellite MICIUS

**2016** – European quantum manifesto

**2019** – experimental demonstration of quantum supremacy (Google)

**2019** – European Quantum flagship

**2020** – quantum key distribution (Ekert91) between Vienna and Bratislava



# QUANTUM INFORMATION TECHNOLOGIES



**“[QIT] is a radical departure in information technology, more fundamentally different from current technology than the digital computer is from the abacus”.**

William D. Phillips, 1997 Physics Nobel Laureate

# Big vs small

## Organizations and Projects

## Industry



IBM Q-Net



## Academia, Research Labs and Agencies

# World wide investments



# EU & member states plans

- Complement European / National efforts
- Complementarity / synchronization of European / National strategies
- Pool resources / competences
- QCI
- Quantum Computing and Simulation
- Manufacturing
- Equity funds
- ...

	EU	NL	FR	DE
<b>Planned funding for QT</b>	<b>1 950 M€</b>	<b>615 M€</b>	<b>1 815 M€</b>	<b>2 000 M€</b>

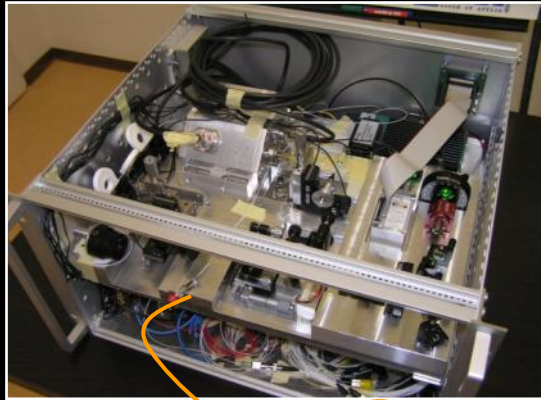
<b>Horizon Europe Quantum Flagship 850 M€</b>	<b>DEP (hybrid) q-comp 400 M€ + MS</b>	<b>DEP EuroQCI 500 M€ + MS</b>	<b>CEF2 Digital EuroQCI 200 M€</b>
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**Is there a chance for us?**

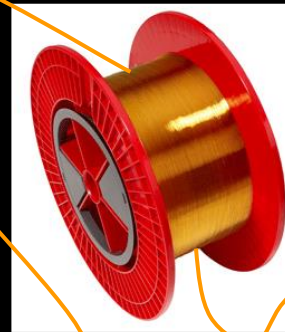
**YES**

# QKD Wien-Bratislava 2020

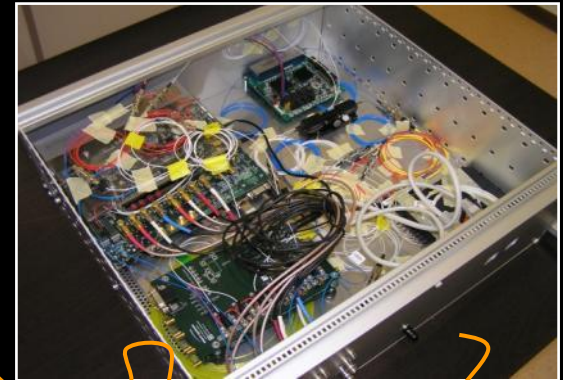
Fully integrated QKD system at telecom wavelengths



**Alice**



Standard telecom fiber



**Bob**

