

Quantum Technologies courses for Industry



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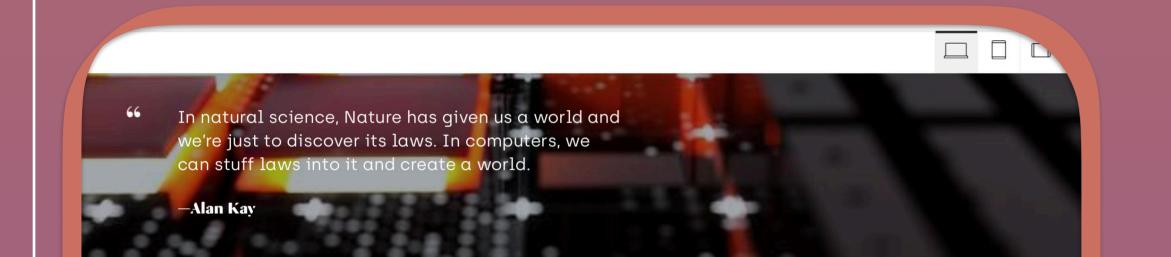
MOTIVATION

Quantum technologies, from computing to sensing to communication, are expected to massively impact multiple sectors in the near future (transport, energy, pharmaceutical, ...), involving not only academics but society at large. In order to seize the rapid changes, companies need talent with education in quantum technology at all levels, able to incorporate these emerging technologies into existing businesses. New specific curricula in universities have started to narrow the gap, however it is too early for them to fill the current shortage of a skilled quantum workforce. QTIndu (Quantum technology courses for Industry) is a solution that creates short-term training programs in quantum technologies for professionals from other fields. The material is tailored to the requirements of enterprises from several business sectors and developed according to the different background of various professional roles. We present below our contribution to the project.

INSPIRATION QUANTUM Executive ed

QUANTUM COMPUTING- THE SOFT WAY Hands-ON

We introduce the basic concepts of quantum science to prepare you for your quantum computing journey, without the use of mathematical formalism. At the end of the course, you will be able to distinguish hyped or misleading from accurate sources of information on quantum technologies.



Let's now focus on Quantum Computing: we'll try to figure out what quantum computers are (and what they're not), and what their potential is

accuracy

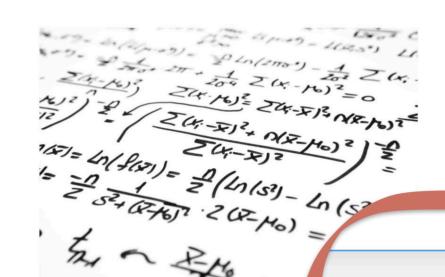
But here's the caved

scientific

In order to dive into the subject and fully understand all the details about quantum computing, you would need mathematics.

In this crash course, we will dig into some of the most fundamental concepts as deep as it is possible, leaving equations aside.

However, it requires time to seize its fascinating complexity. We encourage you to give it a try: we'll be happy to help



Knowledge Checkpoint

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fore starting the next section, let's conduct a small experiment

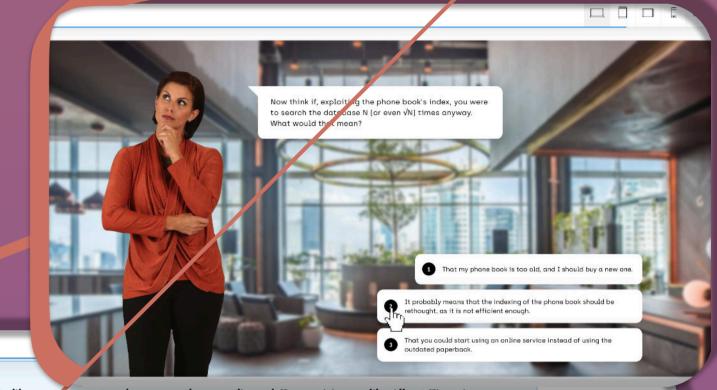
From qubits, gates and quantum circuits to the effect of noise in near term devices, the course is a hands-on practical introduction to the basics of quantum computing to start working with quantum software NOW.

Audience: software engineers, computer scientists, project managers, job seekers. Knowledge of basic math and linear algebra, no background in physics.

Learning outcomes:

- high-level understanding of basic concepts in quantum computing and how to interpret a quantum circuit
- Imits and bottlenecks of near term devices
- assess the platforms available in terms of software and hardware





puzzled by entanglement, especially between distant systems, and not by chance calle

Audience: business strategists, managers, policymakers, marketing personnel, job seekers. No previous background in physics or STEM

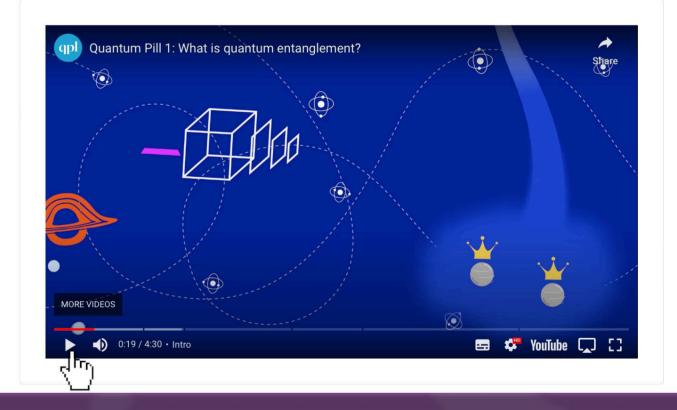
As brought up earlier, it is quite common to encounter misleading or unreliable information regarding QT and quantum computing, even in well-established sources! Below you'll find two videos explaining quantum computers to non-exper-

Below you'll find two videos explaining quantum computers to non-experts. Some of the informatio presented is inaccurate or unreliable. We challenge you to identify which sentences are "wrong", in part The aim is to develop an understanding of how deep the conceptual ideas behind quantum computing are (and how difficult it's to describe them to a non-expert)

they're just misleading or plain wron

phenomeron "spooky action at a distance"

if you want to gain deeper insights, watch this other Quantum Pill



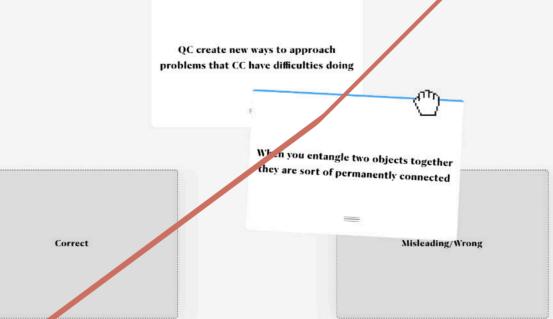
Learning outcomes:

- why quantum computing is different from classical computing
- distinction between fault-tolerant and near term quantum device
- applications of near term devices in the coming years



What are the potentials of quantum technologies for the healthcare and life science business sector? An overview on open problems in the field, and how they are being addressed by these new technologies in existing collaborations.







Employee cd. How can quantum technologies help professionals in the healthcare and life science fields do their job better?

Analysis of use cases of quantum technologies in clinical research and in drug design, how they will provide an advantage and what are the current limitations.

Track 2: drug discovery

Track 1: clinical Audience: clinical researcher, chemists, biologists. Knowledge of basic math and chemistry

Audience: clinicians, hospital managers, project managers in life science research labs. No previous background in physics or mathematics.

Goals: identify strategic use-cases

fig. adapted from PRX Quantum 2, 040342 (2021)

Goals:

establish a common vocabulary to successfully work with quantum experts ► start a collaboration





Audience: computational biologists, engineers, life science researcher. Basic knowledge of classical computational methods, no background in physics