The CERN Quantum Technology Initiative

QUANTUM
TECHNOLOGY
INITIATIVE

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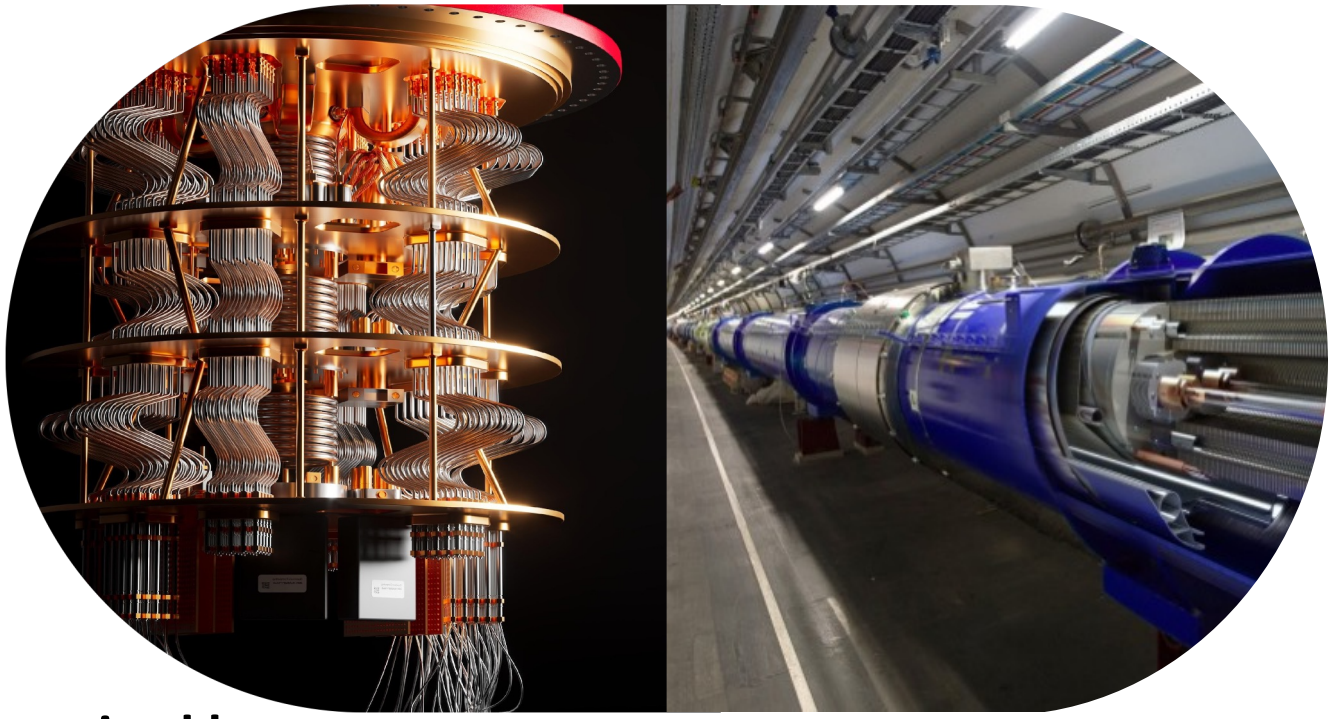
CERN

How does CERN engage in Quantum Technologies?



QT4HEP

Develop technologies required by the CERN scientific programme

Integrate CERN with future quantum infrastructures

HEP4QT

Extend and share technologies available at CERN

Boost development and adoption of QT beyond CERN

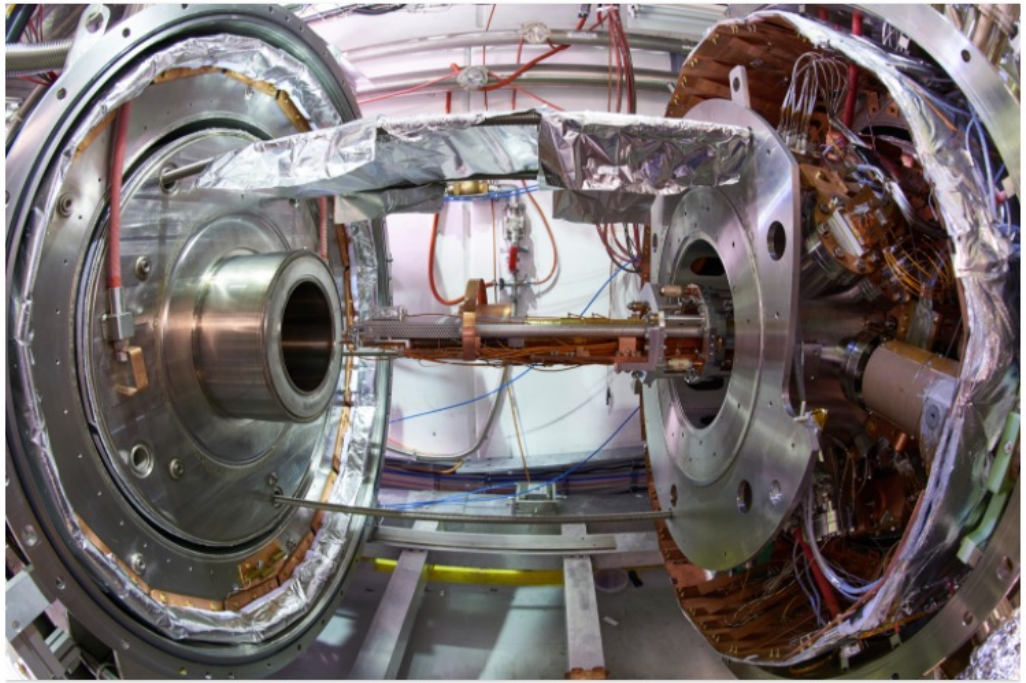
The CERN QTI launched in 2020

Voir en français

CERN meets quantum technology

The CERN Quantum Technology Initiative will explore the potential of devices harnessing perplexing quantum phenomena such as entanglement to enrich and expand its challenging research programme

30 SEPTEMBER, 2020 | By Matthew Chalmers



The AEgIS 1T antimatter trap stack. CERN's AEgIS experiment is able to explore the multi-particle entangled nature of photons from positronium annihilation, and is one of several examples of existing CERN research with relevance to quantum technologies. (Image: CERN)

Main objectives

- Identify areas where CERN can make an impact
- Understand impact of quantum technology on CERN programme
- **Collaborate with quantum initiatives in the CERN Member States**
- **Facilitate collaboration within HEP and between HEP and Quantum Tech.**

QTI Roadmap: https://doi.org/10.5281/zenodo.5553774

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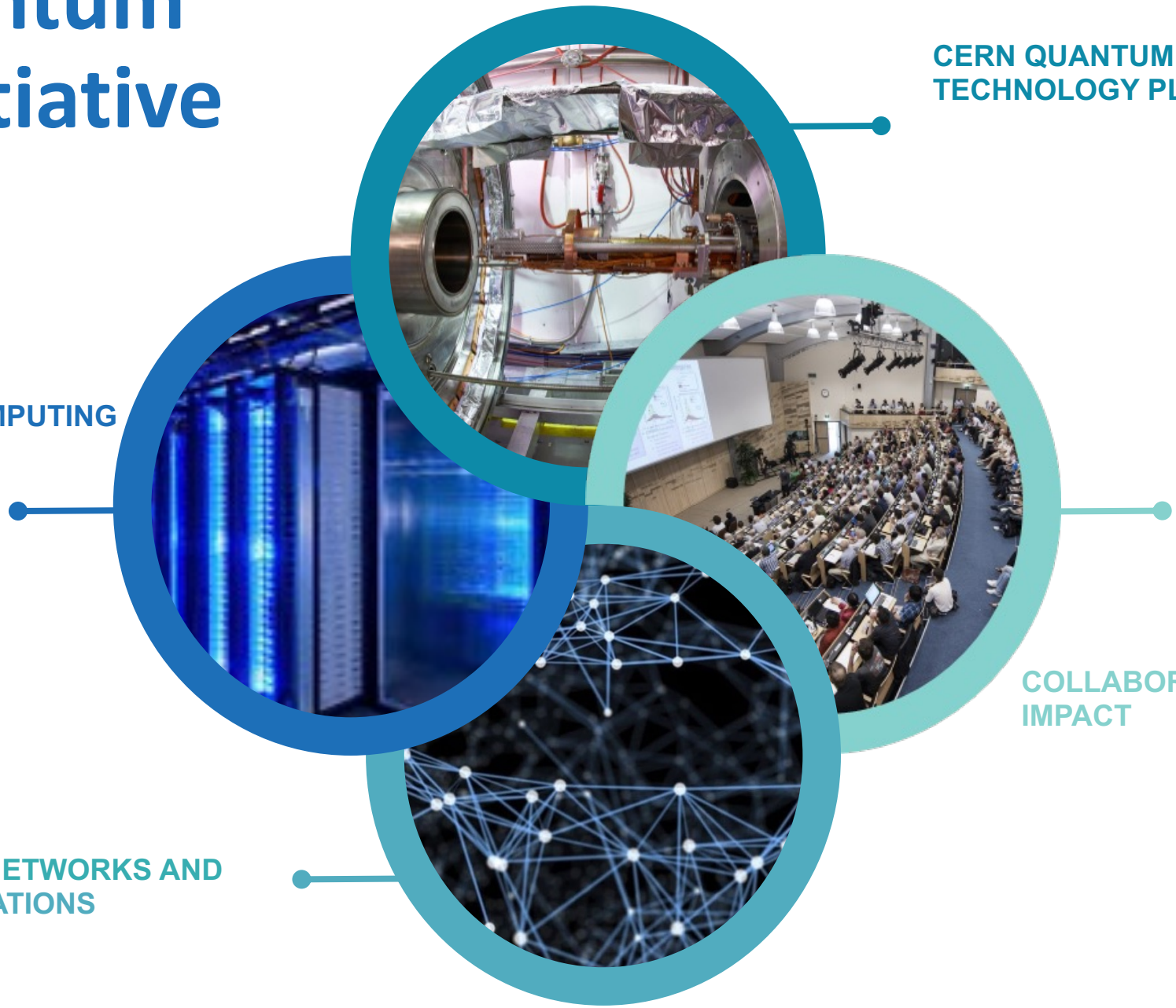


CERN QUANTUM TECHNOLOGY PLATFORMS

HYBRID QUANTUM COMPUTING AND ALGORITHMS

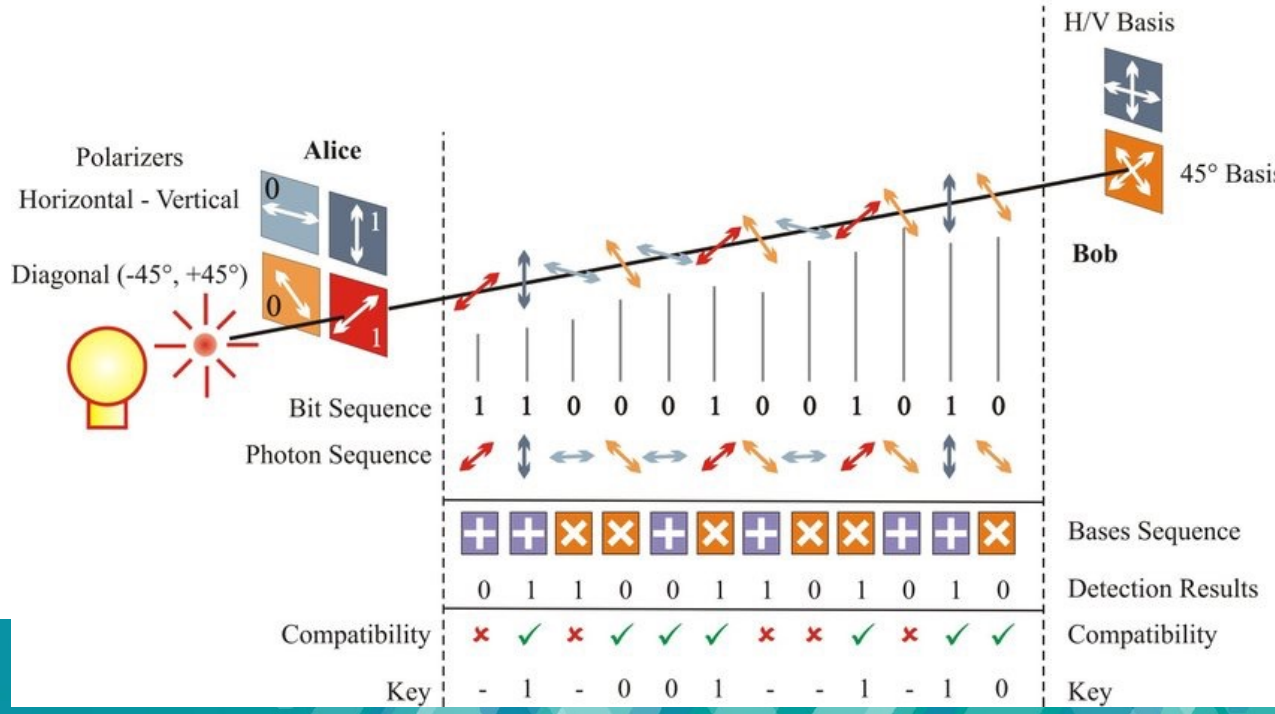
COLLABORATION FOR IMPACT

QUANTUM NETWORKS AND COMMUNICATIONS

CERN | QUANTUM TECHNOLOGY INITIATIVE

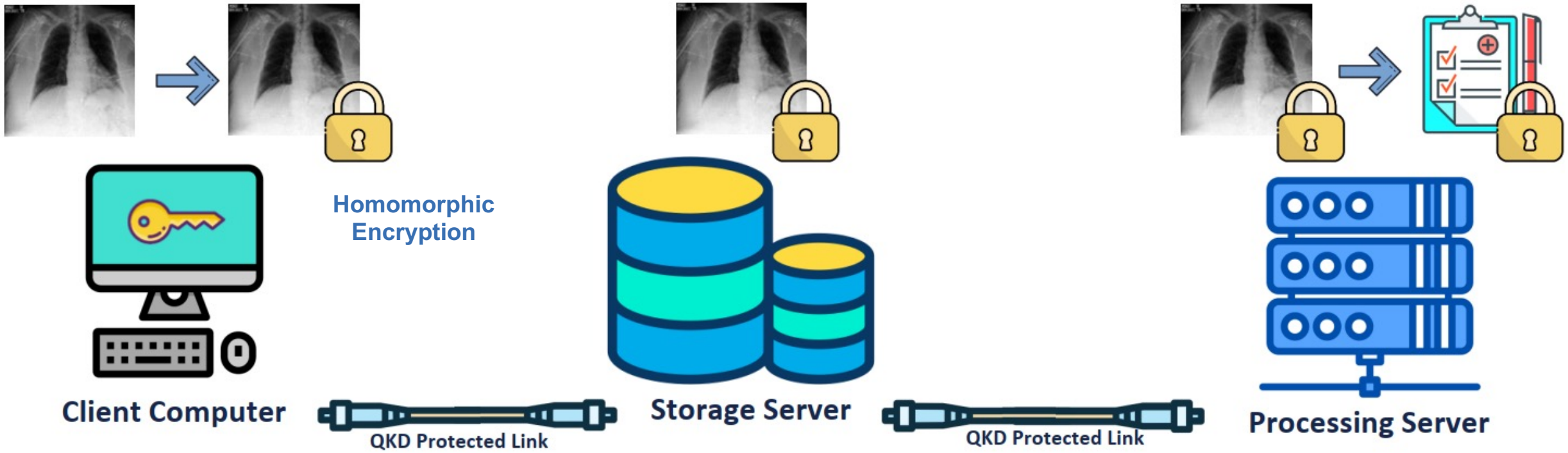
Secure Data Analytics

- QKD simulator including attacks
- Quantum Key Distribution (BB84 protocol)
- QKD link between CERN and the IDQ Data centre hosted by SIG in Geneva



The Quantumacy Platform

Secure Federated Learning demonstrator



Example of a block chain framework to record and validate transactions across a distributed data analysis pipeline using keys generated by the QKD infrastructure and homomorphic encryption.

https://doi.org/10.5281/zenodo.7539229

…towards quantum internet…

A central role in the development of an open quantum infrastructure and communication inter-network

Image credit: vecteezy.com

Thank you

.. and welcome to CERN!