CERN QTI Education & Outreach

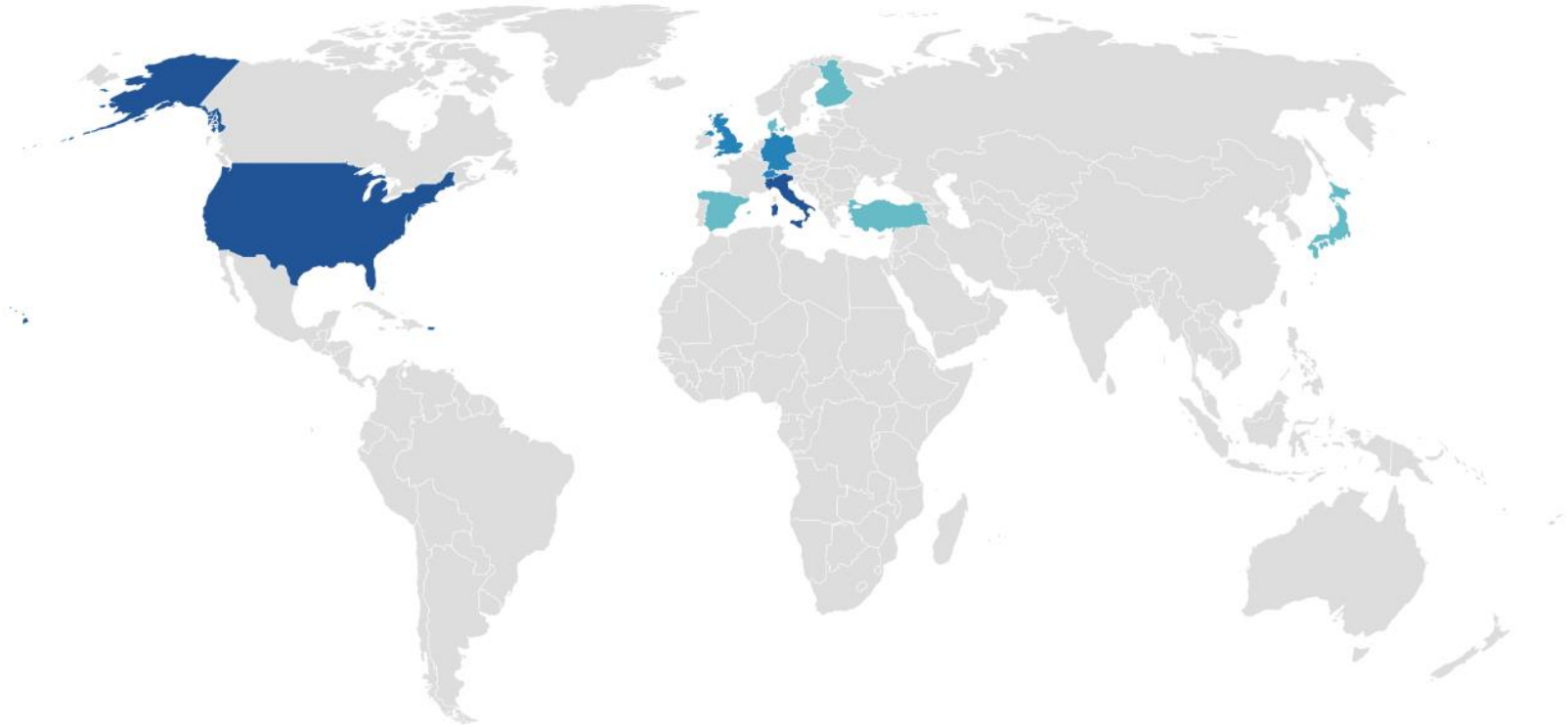
Maurizio Pierini, Anastasiia Lazuka

QUANTUM
TECHNOLOGY
INITIATIVE

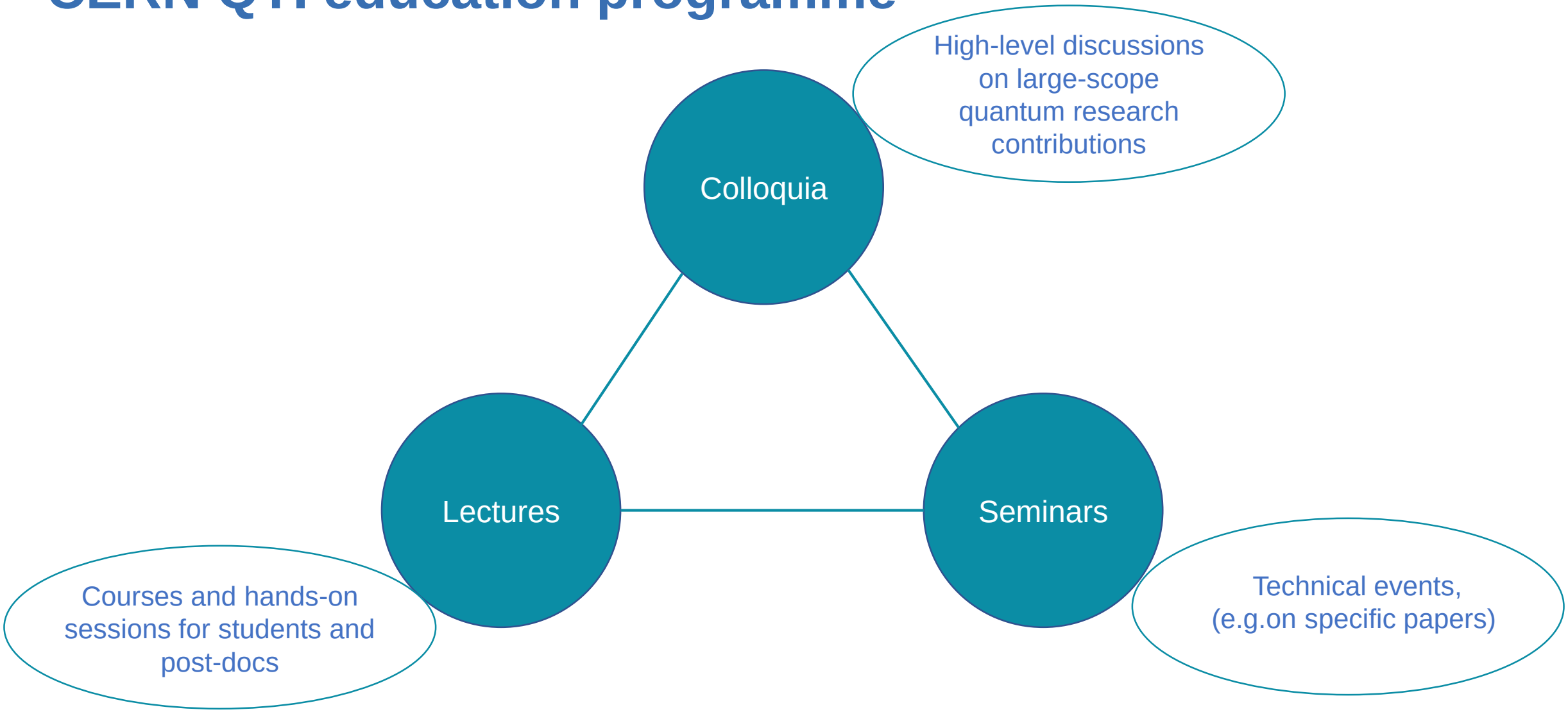
10/12/2021

CERN QTI education & training

- PhD-programme (as part of the existing CERN DOCT scheme)
- Exchange programmes (visiting professorships and scientific associates)
- Education and training events



CERN QTI education programme



Colloquia

1. **Frequency:** once/month.
2. **Focus:** review-talks from the key players in quantum research.
3. **Audience:** CERN community.

CERN Colloquium

Quantum Computational Supremacy and Its Applications

by Prof. Scott Aaronson (UT Austin, US)

Thursday 30 Jul 2020, 16:30 → 17:30 Europe/Zurich

Remote only (CERN)

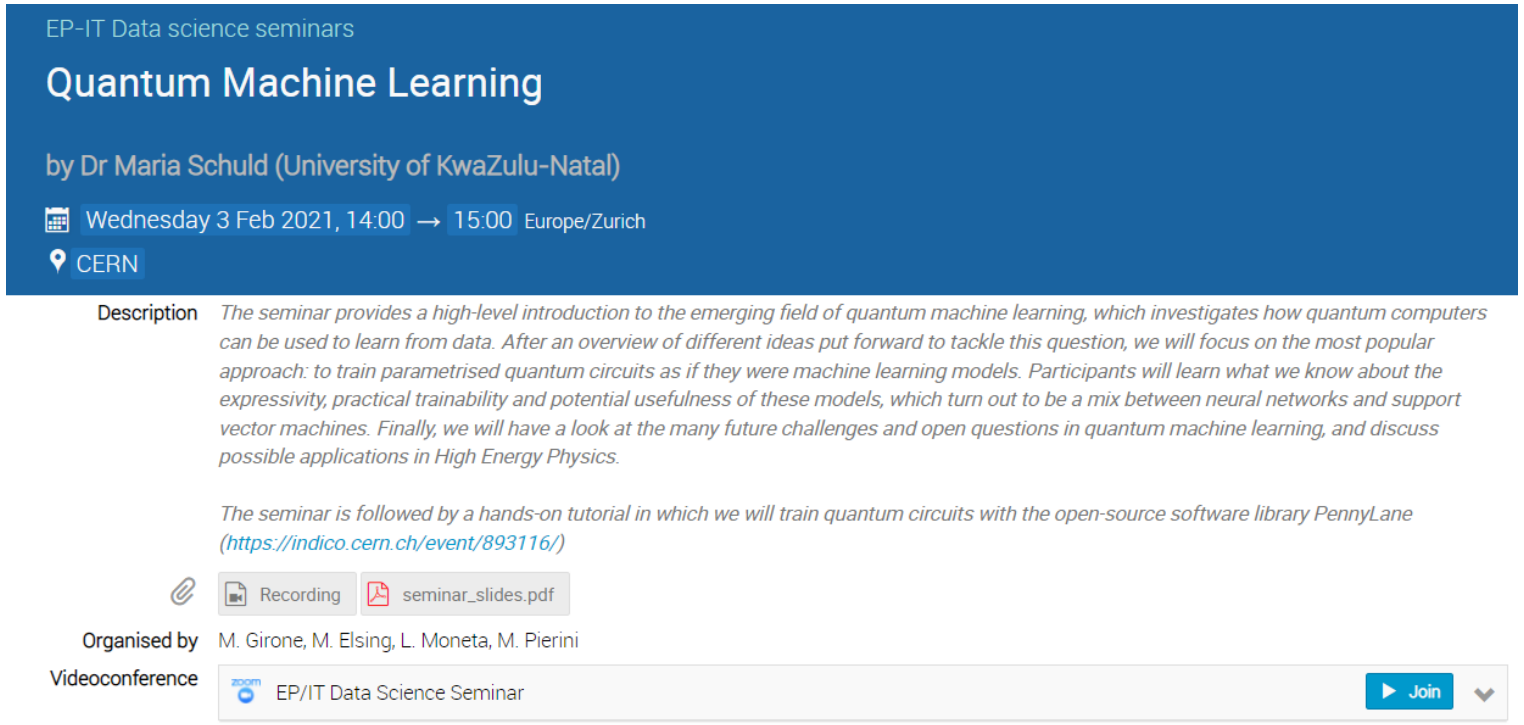
Description Last fall, a team at Google announced the first-ever demonstration of "quantum computational supremacy"---that is, a clear quantum speedup over a classical computer for some task---using a 53-qubit programmable superconducting chip called Sycamore. Google's accomplishment drew on a decade of research in my field of quantum complexity theory. This talk will discuss questions like: what exactly was the (contrived) problem that Sycamore solved? How does one verify the outputs using a classical computer? And how confident are we that the problem is classically hard---especially in light of subsequent counterclaims by IBM and others? I'll end with a possible application that I've been developing for Google's experiment: namely, the generation of trusted public random bits, for use (for example) in cryptocurrencies.

Recording

Organised by Wolfgang Lerche / TH-SP

Seminars

1. **Frequency:** twice/month.
2. **Focus:** invite researchers at CERN to present their work; co-host events with other institutes.
3. **Audience:** people with previous knowledge in quantum research field.



EP-IT Data science seminars

Quantum Machine Learning

by Dr Maria Schuld (University of KwaZulu-Natal)

Wednesday 3 Feb 2021, 14:00 → 15:00 Europe/Zurich

CERN

Description *The seminar provides a high-level introduction to the emerging field of quantum machine learning, which investigates how quantum computers can be used to learn from data. After an overview of different ideas put forward to tackle this question, we will focus on the most popular approach: to train parametrised quantum circuits as if they were machine learning models. Participants will learn what we know about the expressivity, practical trainability and potential usefulness of these models, which turn out to be a mix between neural networks and support vector machines. Finally, we will have a look at the many future challenges and open questions in quantum machine learning, and discuss possible applications in High Energy Physics.*

The seminar is followed by a hands-on tutorial in which we will train quantum circuits with the open-source software library PennyLane (https://indico.cern.ch/event/893116/)

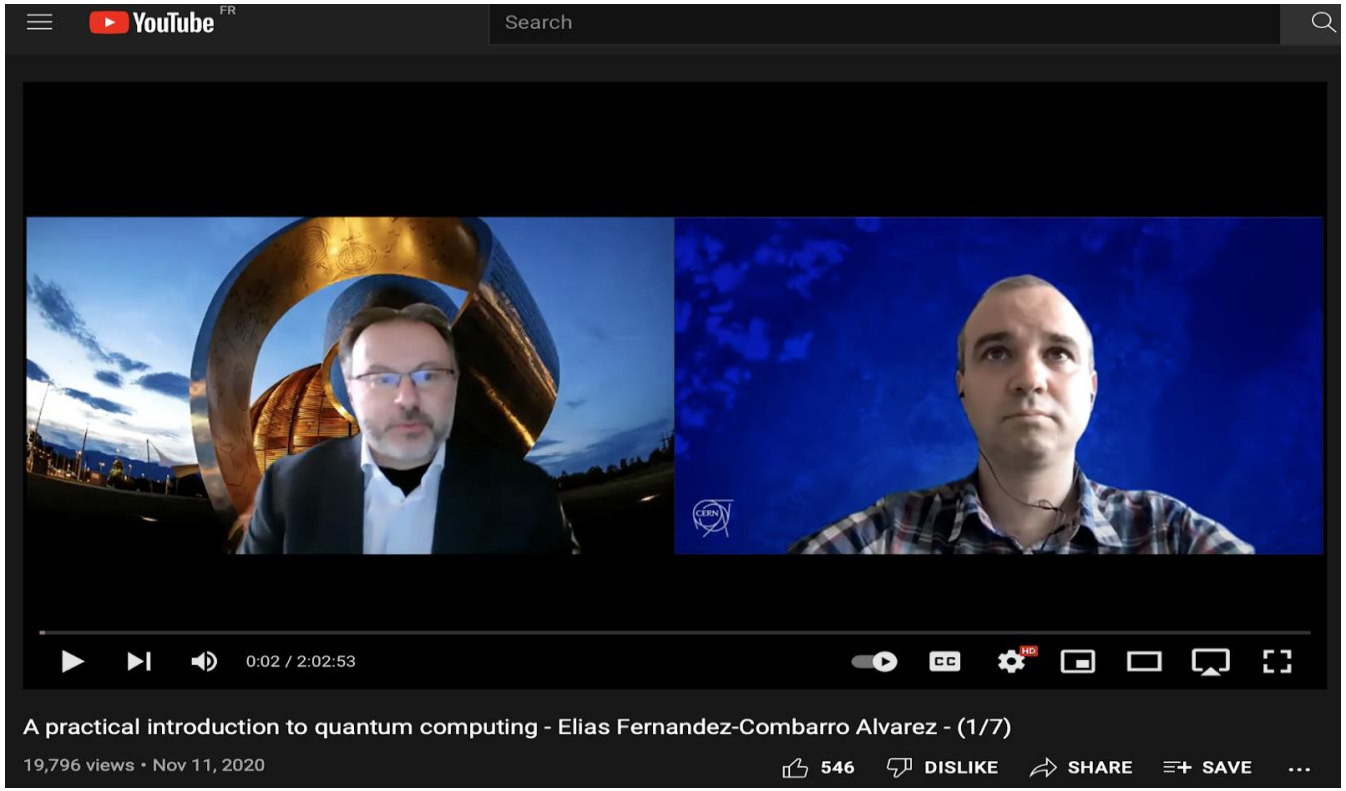
Recording seminar_slides.pdf

Organised by M. Girone, M. Elsing, L. Moneta, M. Pierini

Videoconference EP/IT Data Science Seminar Join

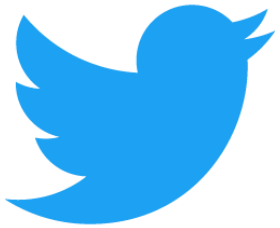
Lectures

1. **Frequency:** one-week events, twice/year.
2. **Focus:** establish a programme for students witin CERN QTI and beyond.
3. **Audience:** quantum students & post-docs (+ general public curious about the topic).



***Quantum computing lectures** by Elias Fernandez-Combarro reached **1,500** live **participants** and **20K views** on YouTube*

CERN QTI on social media



@CERNquantum

CERN Quantum Technology Initiative


CERN
QUANTUM
TECHNOLOGY
INITIATIVE