

# CERN Shapes Future Quantum Techniques in Machine Learning

Problem solving gets faster if quantum methodologies are used instead of classical computers. Physicists and computer scientists are therefore working closely together to explore this potential. In November, the [7th International Conference on Quantum Techniques in Machine Learning \(QTML\)](#) was held at CERN, bringing together more than 300 researchers and industry partners in the field.



Natalia Ares from the University of Oxford presents machine learning for tackling quantum device variability at the 7th International Conference on Quantum Techniques in Machine Learning, held at CERN in November. More than 300 people attended in person, with more following online.

(Image: CERN)

Machine learning uses data and algorithms to help computers to learn patterns and perform more effectively at tasks ranging from helping doctors to diagnose cancer to improving facial recognition. Combining techniques from quantum physics with machine learning can reduce the number of steps needed for algorithms to obtain a correct answer.

"CERN is putting significant effort into developing quantum technology for particle physics and beyond, through the Quantum Technology Initiative and

the Open Quantum Institute," explained Alberto di Meglio, head of the Innovation section in CERN's IT department, in his opening speech. As well as talks from researchers, organisations and companies showcased their latest developments, with talks from ESA, Google, IBM, Intel, IONQ, NASA and PASQAL. Applications ranged from optimising aircraft cargo loading to developing new algorithms to study lithium compounds and their chemical reactions in battery chemistry. "The presence of major industry partners was a key element of the conference," confirms Michele Grossi, senior fellow in quantum computing and algorithms at CERN. "The continuous interaction between industry and academia is helping the community to drive the quantum revolution in a fair way."

The conference was organised without parallel sessions, which divide participants, enabling researchers from various fields to interact. "This conference allowed more than 300 people to gather each day to exchange around one focused theme," says Miguel Marquina, senior staff member in CERN's IT department. "It is powerful to experience such an engaging environment."

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