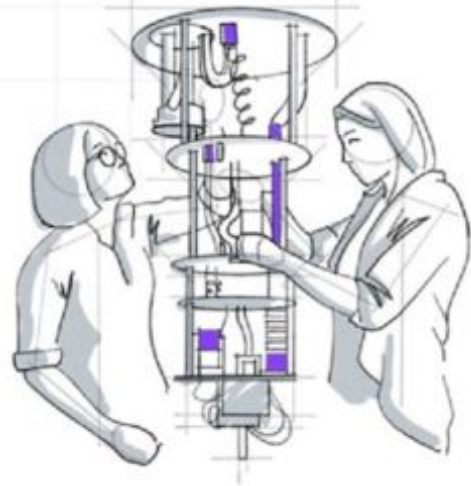


Qiskit Hackathon Europe Research Study Groups

April 20 - June 14



Qiskit Hackathon Europe Winners

ICFO team wins with project on $i\frac{1}{2}$ Quantum Anomaly Detection

June 28, 2021

Qiskit is the open-source software package used to simulate and operate quantum computers from IBM and was founded by IBM Research. Regular events promote the use of Qiskit and active contributions from the quantum computing community.

The 2021 Qiskit Europe Hackathon began in April 2021, open to research study groups who came together to collaborate and build quantum computing projects. In Phase 1 of the competition, participants pitched original ideas, formed teams, and turned their ideas into a viable project proposal based on Qiskit. The top 20 proposals proceeded to Phase 2, in which teams had four weeks to implement a Qiskit research project proposal, culminating in the creation of a project report and a video presentation for the chance to win 3000 € for the top three projects as determined by Hackathon judges.

A team made up of ICFOians Korbinian Kottmann, Joana Fraxanet, Niccolo Baldelli plus

Friederike Metz from Okinawa Institute of Science and Technology implemented one of the winning projects. This project proposed to find an application of quantum machine learning for quantum data, using Variational Quantum Anomaly Detection to map out the phase diagram of a complex quantum many body systems. Their idea consisted of stimulating a system on a quantum computer and then performing a variational circuit to detect different phases on the same device. The team was able to show in simulation that this works well and can even detect a symmetry protected topological phase. Furthermore, they performed the algorithm on a real quantum computer hosted by IBM to demonstrate its applicability. These results from the hackathon have been [published as a preprint](#).

Congratulations to everyone on the ambitious project and the successful outcome of this very competitive Hackathon!