



A €1-billion (US\$1.1-billion) European flagship project could advance the state of quantum computing.

## FUNDING

# Billion-euro boost for quantum tech

*Third European Union flagship project will be similar in size and ambition to graphene and human-brain initiatives.*

BY ELIZABETH GIBNEY

The European Commission has quietly announced plans to launch a €1-billion (US\$1.1-billion) project to boost a raft of quantum technologies — from secure communication networks to ultra-precise gravity sensors and clocks.

The initiative, to launch in 2018, will be similar in size, timescale and ambition to the two existing European flagship projects, the decade-long Graphene Flagship and the Human Brain Project — although the exact format has yet to be decided, Nathalie Vandystadt, a commission spokesperson, told *Nature*. Funding will come from a mix of sources, including the commission, as well as other European and national funders, she added.

The commission is likely to have a “substantial role” in funding the flagship, says Tommaso Calarco, who leads the Integrated Quantum Science and Technology centre at the Universities of Ulm and Stuttgart in Germany. He co-authored a blueprint behind the initiative, which was published in March,

called the Quantum Manifesto. Countries around the world are investing in these technologies, says Calarco — without such an initiative, Europe risks becoming a second-tier player. “The time is really now or never.”

On 19 April, the commission formally announced its intention to support the initiative. Confusingly, the project is included under plans to launch a cloud-computing portal called the European Open Science Cloud, even though the remit of the quantum project will extend far beyond computing. (In the same announcement, the commission said that it would spend €2 billion on the cloud-computing initiative by 2020.)

## QUANTUM BUZZ

High-profile US companies are already investing in quantum computing, and Chinese scientists are nearing the completion of a 2,000-kilometre-long quantum-communication link — the longest in the world — to send information securely between Beijing and Shanghai.

In Europe, the flagship is expected to fuel the

development of such technologies, which the commission calls part of a “second quantum revolution” (the first was the unearthing of the rules of the quantum realm, which led to the invention of tools such as lasers and transistors).

The initiative will include support for relatively near-to-market systems, such as quantum-communication networks, ultra-sensitive cameras and quantum simulators that could help to design new materials. It will also look long term, pushing more-futuristic visions such as all-purpose quantum computers and high-precision sensors that fit into mobile phones.

Success will be judged by how well the flagship boosts industry take up of the technologies and seeds investment in the field, says Calarco: “If this doesn’t happen, it will be a failure. But everyone is very confident it will”.

Quantum-technology projects already exist in a few individual European Union countries, such as the UK Quantum Technologies Programme and the Netherlands’ QuTech initiative, notes Marco Genovese, a quantum physicist at the Italian National Institute of Metrological Research in Turin. But to reach commercial level in the near future, an EU-wide initiative is essential, he says. “At the moment, EU industry is still only marginally involved,” he says.

Europe’s graphene and brain-project flagships were announced with great fanfare in 2013, after a multiyear competition, but the latest initiative has had a much quieter birth. Calarco says that it was driven by an 18-month dialogue between the commission and a group of researchers who, at the organization’s request, produced the manifesto.

Not everyone is pleased with this approach. Choosing flagships on the basis of bilateral discussions and manifestos risks turning them into “a competition of lobbying, rather than of arguments evaluated objectively in a fair competition of scientific ideas”, says Adrian Ionescu, a nanoscientist at the Swiss Federal Institute of Technology in Lausanne. (Ionescu led an unsuccessful shortlisted project in the 2013 competition, called Guardian Angels for a Smarter Life, which would develop sensors to track environmental pollution and human health.) But the commission says that it is still running a separate consultation to identify candidates for future flagship projects, and that the quantum initiative does not prevent the launch of other flagships.

Genovese warns that the new project must be careful to avoid the problems faced by existing giant flagships, which included accusations of mismanagement and veering off course. “The building of the flagship must involve all the main research groups that have really significantly worked in the field through a bottom-up approach, and the concentration of power should be avoided,” he says.

The commission is set to announce more details at the Quantum Europe Conference in Amsterdam on 17–18 May, where the manifesto will be officially launched. ■

MICHAEL FANG/MARTINIS GROUP