Start of the future Quantum Internet research program in Catalonia with Next Generation funds

The research program coordinated by ICFO, with participation of IFAE, ICN2, UB, UPC and UAB, aims to develop technologies for the future Quantum Internet.

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A new research program that aims to carry out research on quantum technologies, with th ultimate goal of being applied in the future European Quantum Internet, has been officiall launched with the participation of six research institutions based in Catalonia. The projec has been funded with 15 MEUR over the next three years, of which 9.7 MEUR have bee funded by the European Union Recovery and Resilience Mechanism, through the Ministry o Science and Innovation, and 5.3 MEUR allocated by the Generalitat de Catalunya through th Department of Research and Universities

Participating institutions in the program include ICFO - the Institute of Photonic Sciences, the Catalan Institute of Nanoscience and Nanotechnology (ICN2), the Institute of High Energy

Physics (IFAE), the University of Barcelona (UB), the Polytechnic University of Catalonia (UPC) and the Autonomous University of Barcelona (UAB).

Valerio Pruneri, ICFO researcher, leader of the European Quantum Communications program and general coordinator of the "Quantum Communication" project, introduced the main objectives. During the event, the strategic lines of the program were presented, emphasizing the lines of action and the different subprojects that will be developed regarding the software and hardware arenas within the framework of this initiative. Then, several transversal projects were commented as possible first steps in achieving considerable synergies and future collaborations at a European level.

The implementation this project is a clear example of how advanced this area of ??knowledge is, a basis on which the foundations of major European initiatives are being laid. This is the case of **EuroQCI** (European Quantum Communications Infrastructure), whose objective is to build a quantum communications infrastructure in Europe, both through terrestrial quantum connections as well as satellite connections to cover great distances and span the entire continent.

In the short run, quantum communications are of great interest in the world of telecommunications, specifically in the field of cybersecurity, to offer an additional security layer to the currently existing technologies for secure transmission of data and information over the Internet. The ultimate goal is the implementation of the so-called Quantum Internet, which will connect all kinds of quantum systems, such as computers, processors, simulators and sensors, through a network capable of distributing rigorously quantum resources, such as the so-called quantum entanglement, through a conventional telecommunications network reinforced with quantum elements.

About the program

The main objective of the program is focused on research development of concepts and technologies that are currently not commercially available, both in communications and in computing, sensors and quantum materials. Various types of hardware and software that can be integrated into telecommunications networks will be addressed. Solutions will also be sought for those technologies that are most optimal for long distances, unknown at present. In parallel, work will be done on the development of quantum repeaters and memories to achieve quantum communication through optical fibers over distances of more than 100km, which represent a scientific challenge - with no currently known solution.?

At the same time, technology will be investigated for the ultra-precise distribution of tim signals, for the connectivity of quantum sensors and distributed quantum computing, as wel as the exploration of the properties of quantum materials, areas of knowledge in which th objectives set are in the medium run and for which continuous research development i required, given the enormous scientific and technological challenges that arise

Transversal lines have also been established focused on the training of personnel, a trainin

effort that puts special emphasis on the capacity for entrepreneurship which, together wit the creation of an industrial ecosystem and the development of new circuits for th dissemination and exploitation of the results, aims to effectively transfer the scientific an technological knowledge from the laboratory to the market, with a significant and beneficia impact on society

An important part of the program is also focused on supporting technology transfer as wel as consolidating and creating new technology-based companies in the field, by following th footsteps of companies created in recent years, such as Quside, Luxquanta, Qurv an Qilimanjaro, who seek to have a relevant role in the sector at a worldwide level

The "Quantum Communication" program is focused on research projects and will b developed in parallel to other programs, financed mainly by the European Commission aimed at a gradual deployment of technologies for the creation of the Quantum Internet. Th first phase of the aforementioned deployment will take place throughout the decade and wil involve companies from the telecommunications infrastructure sector. In Catalonia, Cellne Telecom has a leading role in the terrestrial sector

The Complementary Plans of the Ministry of Science and Innovation

The Complementary Plans are a new funding instrument of the Ministry of Science and Innovation within the Recovery, Transformation and Resilience Plan, aimed at establishing collaborations with the autonomous communities in R+D+I actions whose objectives are to create synergies, align the execution of funds and establish common priorities for the entire region.

As part of these plans, 8 priority areas of scientific-technical interest have been selected

(1) Biotechnology applied to healt
, (2) Marine Science
, (3) Quantum communicatio
, (4) Renewable energy and hydroge
, (5) Agri-foo
, (6) Astrophysics and high energy physic
, (7) Advanced material
, (8) Biodiversit

With the purpose of establishing territorial synergies, it seeks to take advantage of the uniq e capacities and infrastructures of each region and, in turn, promote the participation of t e industry and business frameworks. For these plans, a total of 466 million euros have be n allocated until 2025, of which 299 million come from the EU Recovery and Resilien e Mechanism, through the Ministry of Science and Innovation, and the rest from t e participating Autonomous Communitie

Recovery, Transformation and Resilience Plan

The Recovery, Transformation and Resilience Plan is a project established by the country aimed to outline the roadmap for the modernization of the Spanish economy, the recovery of economic growth and job creation, for a solid, inclusive and resilient economic recovery after the COVID crisis. It also aims to respond to the challenges of the next decade. It is funded through the Recovery and Resilience Mechanism of the European Union.

Plan de Recuperacion, Transformacion y Resiliencia

El Plan de Recuperacion, Transformacion y Resiliencia es un proyecto de pais que traza a hoja de ruta para la modernizacion de la economia espanola, la recuperacion del crecimien o economico y la creacion de empleo, para la reconstruccion economica solida, inclusiva y resiliente tras la crisis de la COVID, y para responder a los retos de la proxima decada. Es a financiado a traves del Mecanismo de Recuperacion y Resiliencia de la Union Europea.