

QuantumCAT: Accelerating the application of quantum technologies

A consortium of research institutes, led by ICFO, and industry partners in Catalonia join forces to develop the Quantum Technologies Hub.

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About one hundred years ago, scientists of the time tried to explore and understand the nature and behavior of the elements that make up the world that is governed by the laws of quantum physics. Nowadays and with a robust and solid understanding of how that world works, current generations of scientists and engineers are searching for new methods to control and manipulate these elements in order to create a new range of applications for digital technologies. Quantum technologies based on unique properties of quantum physics offer unprecedented capabilities for modern applications of the information society.

Continuously adapting and changing to new situations, societies are preparing for the emergence of novel disruptive technologies that will soon signify a paradigm shift, specifically in the fields of security and privacy of communications via the Internet.

Governments and industries around the world are putting their efforts and beliefs in this scientific-technological trend, and are therefore allocating considerable resources to make it a reality.

Comprised by internationally renowned scientists with extensive experience in quantum technologies, as well as a growing network of companies interested in this field, Catalonia has joined this new wave, establishing a Quantum Technologies Hub in the region called QuantumCAT.

The aim of QuantumCAT is to promote technology transfer and innovation projects with an industrial and social impact in the short and medium term. To achieve this, it aims to focus on transferring discoveries made in research laboratories to the market, by means of industrially viable implementations and applications, addressing three main problems. Firstly, to promote specific and high-potential laboratory technologies and to encourage their industrial deployment and implementation through collaborative and cooperative research efforts. Secondly, to facilitate the dissemination of successful development and innovation strategies at the community level. And thirdly, to conduct outreach actions, such as networking events and workshops, aimed at academic and industry audiences, to discuss experiences and collaborations, as well as share knowledge among the community regarding success stories and use-case studies.

Coordinated by ICFO, QuantumCAT includes leading research institutions in Catalonia, such as ICFO itself, the Autonomous University of Barcelona (UAB), the Polytechnic University of Catalonia · BarcelonaTech (UPC), the University of Barcelona (UB), the Fundacio i2CAT, th Barcelona Supercomputing Center (BSC), the Catalan Institute of Nanoscience an Nanotechnology (ICN2), and together with the Institute of High Energy Physics (IFAE) and th National Center of Microelectronics (CNM) as collaborators. It also includes differen industrial players, such as Metempsy, Volkswagen Group, MemComputing, VetGENOMICS BcnInnova, Cellnex, Keysight Technologies, Quside, AIA Group, Everis, and Telefonica I + D among others.

As Dr. **Morgan Mitchell, scientific coordinator of the initiative**, comments, "This is a very exciting time for quantum technologies. In particular, the support that QuantumCAT is receiving from the community in Catalonia proves it. Those who have been working in this field for many years are delighted to see that policy makers are supporting the acceleration of these technologies towards the development of innovative and relevant applications for industry and societyi¿½.

The Hub will coordinate activities in various technological areas, mainly in: quantum

communication and cybersecurity, quantum computing and simulation, quantum artificial intelligence, and quantum metrology. Developments in these fields will seek to facilitate the transformation of scientific concepts into tangible implementations for industry and citizenship in general, through applications ranging from secure Internet communications to ultra-high precision images for the management of natural resources as well as medicine.

Dr. **Lluis Torner, Director of ICFO**, emphasizes the strategic importance of the field by mentioning that i¿½it was already known that the potential of quantum technologies in t e medium term is enormous; what the COVID episode has shown is that, with the exponenti l growth of security needs and the preservation of privacy in communications that will rema n with us forever in the context of the digitalization of industry, society and economy n general, it is urgent to implement it for companies, entities, and citizens who mana e sensitive data, such as medical, economic or simply private informationi¿½.

On behalf of the Government of Catalonia, the **Hble. Mr. Ramon Tremosa, Minister of Business and Knowledge of the Government of Catalonia**, has stated that i¿½quant m technologies have long been among us to make our day-to-day life easier, overcomi g illnesses or managing complex problems that were previously beyond our reach. We car y them in our pockets in the form of smartphones and use them every time we calculate a route with GPS or an MRI is performed at the hospital.i¿½In addition, he has highlighted that i¿½the commitment to a quantum technologies hub is strategic if we really want to ma e Catalonia a leading country, generating the necessary knowledge to bring competitivene s to companies and, ultimately, quality employment and well-being to society as a whole. t also represents a project fully aligned with the country strategy proposed by the Nation l Agreement for a Society of Knowledge that will establish the roadmap for the future of o r country ".

Finally, the **Hble. Mr. Jordi Puignero, Minister of Digital Policies of the Government of Catalonia,** concludes that i¿½Catalonia has the technological capabilities to become a leading region in the development of quantum technologies and, in turn, profit from t e opportunities for economic development that derive from these. An area of special intere t for the Government lies in the field of quantum cryptography for critical communication , which will allow us to improve the security and privacy of communications networks, one f the challenges identified within the research and innovation program for advanced digit l technologies, included in the digital strategy of the Government of Catalonia i¿½.

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aims to develop and promote the industrial vision of Catalonia, with an open, competitive and sustainable economy, combining talent, creativity, and a diversified business ecosystem in addition to its own system of research of excellence, in the framework of a dynamic, enterprising and inclusive society. Within the region, there are multinational and local companies, which are considered international leaders and experts in emerging technology sectors.

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