

CNR joins IBM Quantum Network

The National Research Council, with its Institute for high performance computing and networking (Icar) and for Informatics and Telematics (Iit), is the first Italian institution to use IBM Quantum with the aim of supporting research projects and professional figures for the development of the country

The Institute for high performance computing and networking (CNR-Icar) and the National Research Council's Institute for Computer Science and Telematics (CNR-Iit) are joining the IBM Quantum Network, a global network of more than 170 organizations with access to IBM's quantum expertise and resources, cloud-based quantum software, developer tools, and premium access to IBM's quantum computing systems.

"CNR is the first Italian institution to participate in the IBM Quantum Network. This agreement opens up the possibility of cooperation with prestigious international partners conducting research in the field of quantum technologies and provides our researchers and the development of the country with a cutting-edge frontier tool, capable of marking a revolutionary breakthrough in several areas, starting from the computer science," said the president of CNR Maria Chiara Carrozza. "The access to the Network is in this first phase intended for researchers of Cnr-Icar and Cnr-Iit that, through these technologies are proposed to promote the formation of new professional figures and research as the quantum engineer, but it is already planned to extend it to other institutes of the CNR."

"Quantum computing," says Alessandro Curioni, director of IBM Research for Europe, "is fundamental, along with classical computers, to address some of the biggest challenges we face: from models to accurately simulate the physical world, and eventually design better medicines and materials, to tools to address complex optimization problems such as those related to climate and financial modeling. Even the objectives of the National Plan of recovery and resilience can find in quantum computing a valuable ally. The entry of CNR in the IBM Quantum Network goes in this direction allowing, also through a public-private partnership, to strengthen the computational capabilities of the country and, at the same time, create and develop new and strategic professional skills."

Over the past two decades, the development of quantum technologies has set the stage for a second technological revolution that will bring transformative advances to science, industry, and society. In particular, the application of quantum technologies will help a variety of industries and disciplines, including finance, energy, chemistry, materials science, optimization and machine learning, and many others.

Members of IBM Quantum Network currently have access to more than 20 quantum computers, including an

Eagle quantum system with the latest 127-qubit processor. IBM plans a development roadmap that will lead to a quantum system with an 1121-qubit processor by 2023, exploring potential quantum advantages - problems we can solve more efficiently on a quantum computer than on the world's best supercomputers - made available to CNR scientists with the goal of solving problems that would be unsolvable with traditional computing technology.

The director of CNR-Icar, Giuseppe De Pietro, adds: "Quantum computation in the coming years will allow to find solutions to scientific problems and applications considered unsolvable with the current supercomputing systems. This will involve a radical change in the way of thinking about the design of algorithms and software, opening up new fields of research. The Institute for high performance computing and networking, with the experience of its researchers in the field of artificial intelligence and machine learning, has taken up the challenge to direct its research activities in the wake of Quantum Intelligence, to propose innovative solutions based on artificial intelligence and able to exploit the enormous potential of quantum computers."

"The availability of quantum computers - intervenes Marco Conti, director of CNR-Iit - opens a new frontier for computer science research, both in the field of computing and in the world of the Internet. These challenges are particularly felt by the researchers of the Institute of Informatics and Telematics, who have developed their research activities in the wake of the Pisan tradition: the first Italian computer, in the '50s, and the birth of the Internet in Italy, in the '80s, that is the milestones in the development of Italian informatics and the digitalization of the country. The hope is to contribute to a new phase starting from the Quantum Computing with the aim to arrive to the Quantum Internet, that is a network based on the transfer of qubits, that is quantum states, instead of simple bits, using the quantum teleportation."

Per ulteriori informazioni: Carlo Venturini (relazioni esterne media per Cnr-Iit), carlo.venturini@iit.cnr.it, cel. +39 3355611596. Claudia Ruffini (relazioni esterne media per IBM), cla@it.ibm.com, +39 3356325093

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