

BSC Quantum Spain computer



Quantum Spain is a project that aims to **promote and finance** a competitive and complete **quantum computing infrastructure in Spain**. It will provide the present Spanish quantum ecosystem with the necessary tools to develop a solid scientific and technological fabric around quantum computing and its applications in Artificial Intelligence.

Quantum Spain is an initiative promoted by the Ministry of Economy through the Secretary of State for Digitization and Artificial Intelligence and financed with the Recovery Funds.

Within Quantum Spain, BSC has included in its catalogue of services the access to a Quantum computer including the required support to help the users in their day to day usage.

The Quantum Computer that will be hosted at BSC-CNS will start with 5 qubits until it reaches 30 qubits.

Quantum computers leverage various technologies to encode and process information. Common types are :

- Superconducting
- Trapped Ion
- Quantum Dot

- Topological
- Photonic
- Diamond-based Qubits.

Each type exhibits unique characteristics influencing its performance in quantum computing applications. Our system is based on **Transmon Superconducting Qubits**. Transmons are a specific type of superconducting qubit widely used in quantum computing. They operate based on Josephson junctions.

The first current 5 qubits chip is already in production in the vendor facilities and will be moved to BSC headquarters during the first part of 2024. The chip's topology is star-like, with four connections. The chip is situated within cryogenic systems, specifically in dilution refrigerators. These refrigerators are designed to reach temperatures approaching absolute zero.

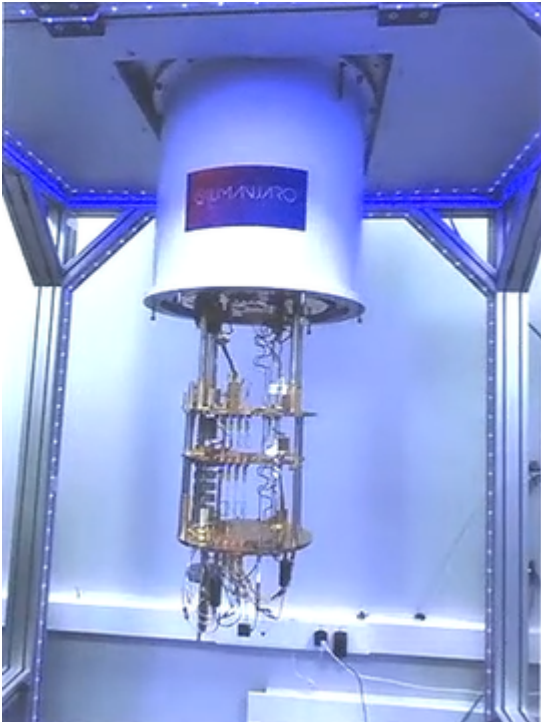


image of the chip in the Qilimanjaro's facilities.

Barcelona Supercomputing Center - Centro Nacional de Supercomputación

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