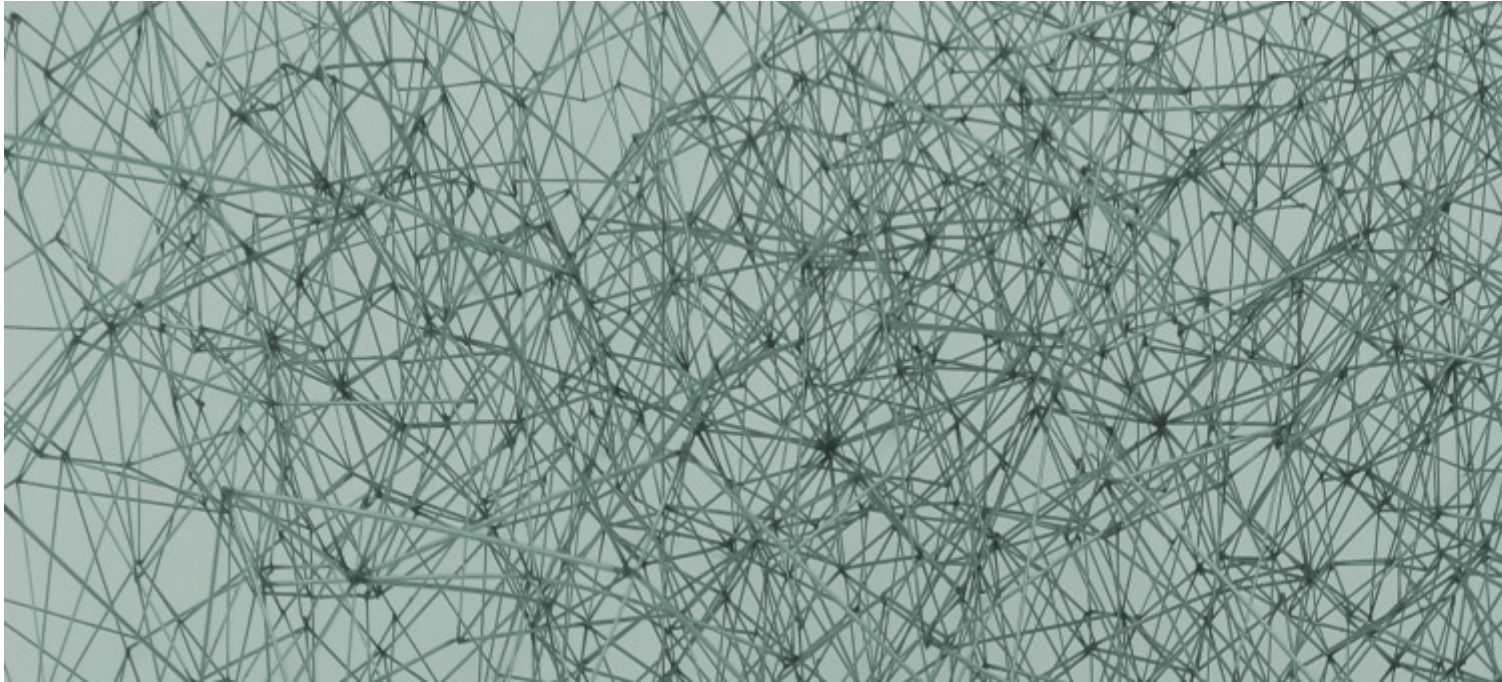


Quantum Algorithms



We design novel quantum algorithms for quantum computation, quantum simulation and quantum annealing. These new algorithms are specifically aimed for small-sized quantum processors that do not require error correcting protocols, with applications to scientific and engineering problems.

Summary

Quantum algorithms are used in Quantum computers to solve hard problems. These algorithms may be adapted to process either classical or Quantum information, and thus able to solve problems in a wide range of applications. Scientific problems considered hard can be addressed by novel Quantum algorithms, with applications on material science or Chemistry. Quantum optimization is seen as a near term candidate for applications in engineering problems.

New small size quantum computers are coming to age and they are already available on the cloud bringing the possibility of exploring new quantum algorithms. However, taking advantage of current devices means optimizing their operation among the hardware limitations offering a limited amount of resources.

Objectives

- Develop strategies to exploit small and medium size quantum computers
- Adapt realistic problems in science and engineering to quantum algorithms
- Develop a quantum operating system to run a small quantum device

Barcelona Supercomputing Center - Centro Nacional de Supercomputación

Source URL (retrieved on 11 Mayo 2025 - 13:32): <https://www.bsc.es/es/research-development/research-areas/quantum-information/quantum-algorithms>