NISQ2LSQ: Job Offer

Junior research leader

in **Quantum LDPC coding**

The project NISQ2LSQ funded by the French Quantum Strategy aims to accelerate R&D efforts in the theory and design of hardware-efficient fault-tolerant quantum codes, focusing on bosonic codes and quantum low-density parity-check (LDPC) codes. On the hardware side, the targeted platforms are superconducting and photonic qubits, as well as neutral atoms.

It is expected that the next generations of quantum processors will incorporate some form of error-correction. Quantum LDPC codes are at the forefront of the efforts to bring about error-free quantum computing.

The theory of quantum LDPC codes has undergone spectacular progress in recent years: asymptotic families of quantum LDPC codes have been constructed that simultaneously achieve a linear rate and a minimum distance linear in the number of physical qubits, where only a few years ago it was not known whether it was possible to achieve minimum distances significantly larger than the blocklength.

A number of research topics remain however, among which finding the best families of QLDPC codes in an non-asymptotic setting, finding efficient ways of decoding them, and making them compatible with fault-tolerant computing schemes. We will also be especially interested in entanglement properties of quantum LDPC codes, via, for example, the local unitary invariants and geometric entanglement within these codes.

The junior research leader will work within the existing research environment at IMB on quantum LDPC codes, will interact with the wider NISQ2LSQ community, and will be expected to develop their LDPC-related research. The position is open for a fixed-term contract of 3 years.

Location: Institut de mathématiques de Bordeaux (IMB),
université de Bordeaux, 351 cours de la Libération, Talence

Starting date: from April 2025
Apply before: 15/03/25

Job requirements: the candidate should have expertise in quantum physics, some aspects of coding theory, and a good track record.

To apply: please send your application to zemor@math.u-bordeaux.fr
Required documents: CV, publication list, research statement, recommendation letters