Characterization and performances of the first $NbSe_2$ qubit

Alessandro D'Elia[1],
Fabio Chiarello[2,1], Daniele Di Gioacchino[1], Alex Stephane Piedjou Komnang[1], A. Giachero[2,3], Carlo Ligi[1], Giovanni Maccarrone[1], Francesco Mattioli[4,1], C.Pira[5], Alessio Rettaroli[1], Javad Rezvani[5], Simone Tocci[1], Claudio Gatti[1],

1 INFN - Laboratori Nazionali di Frascati, Frascati, Roma, Italy

2 Dipartimento di Fisica "G. Occhialini", Universit`a di Milano-Bicocca , Italy

3 INFN, Sezione di Milano-Bicocca, Italy

4 Istituto di Fotonica e Nanotecnologie CNR, Roma, Italy

5 INFN-Laboratori Nazionali di Legnaro, Legnaro, Italy

6 University of Camerino Department of physics, Camerino, Italy

Abstract: In this contribution we will report on the characterization of the first $NbSe_2$ qubit.

Superconducting qubits are the building block to implement large scale quantum computing [1]. The potential of quantum technologies is immense and can be pushed even further by incorporating innovative materials in this discipline. Niobium diselenide ($NbSe_2$), a van der Waals superconductor, emerges as a promising candidate for advanced applications [2].

In this work we will present the performance of the first $NbSe_2$ qubit realized by coupling a $NbSe_2$ Josephson junction with a 3D Aluminium resonator. We will show that this system has all the features of a qubit and that can maintain its coherence properties also in the presence of background photons noise.

The realization and the measurements of the $NbSe_2$ have been performed in the Cryogenic laboratory for detectors (COLD) in the National laboratories of Frascati (LNF, INFN). This project was also funded by the young researcher grant "RESILIENCE" of the 5th national scientific committee of INFN.

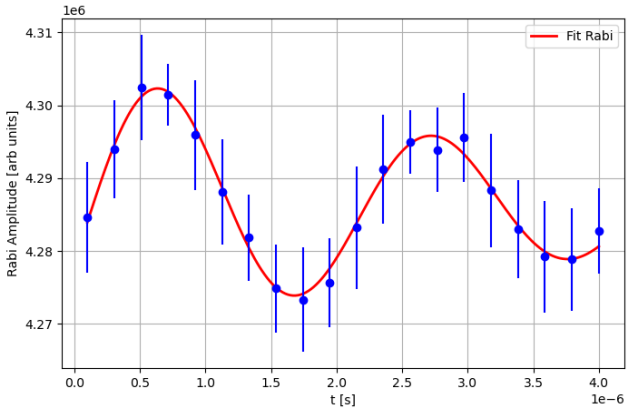

Fig. 1 Rabi oscillations of the $NbSe_2$ qubit

References

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[2] Xi, X. et al. Ising pairing in superconducting NbSe2 atomic layers. Nat Phys 12, 139–143 (2016).