Hermetic packaging for cryogenic experiments

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Abstract

Realizing a universal quantum computer is a complex task. Among the multiple challenges to be solved, extending the coherence times of qubits implemented in solid state nanodevices is of the utmost importance. Implementing qubits made of electrons trapped at the surface of superfluid helium with vacuum offers the opportunity to realize qubits in a noiseless environment, extending the qubit lifetime [1]. Furthermore, these qubits are compatible with standard circuit quantum electrodynamic (CQED) techniques for manipulation and readout [2].

In this talk we introduce our newest commercial packaging, used to perform experiments in completely sealed environments at cryogenic temperatures. The technology is based on our recently developed QCage chip carrier [3], which has been optimized for CQED experiments [4,5]. We demonstrate the superfluid helium tightness of this packaging by investigating how the resonance frequency of superconducting coplanar waveguide resonators is evolving as the chip cavity is filled with superfluid helium at cryogenic temperatures.

References

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