Electrically tunable Josephson parametric amplifier based on graphene Josephson junctions

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Parametric amplifiers are crucial components in the field of superconducting quantum circuits. They are essential to readout of qubits with the best fidelity thanks to their quantum limited noise and can produce non classical states of light. There have been developments in recent years to use a semiconductor weak link as an electrically tunable source of nonlinearity, serving as the building block for these amplifiers [1,2,3,4]. Here, we use a graphene Josephson junction as the semiconductor weak link to demonstrate a gate tunable Josephson parametric amplifier. Our previous work exhibited such devices operating in the 4 wave mixing regime with a gain of 20dB and about 1 GHz of frequency tunability with a gate voltage. We present our efforts in developing a parametric amplifier with graphene Josephson junction working in the three wave mixing regime. We also discuss the squeezing properties of the amplifier.

References

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