

Superconducting Travelling Wave Parametric Amplifiers: from near quantum-noise-limited amplification to microwave photonics

Martina Esposito

SPIN Institute, CNR, Naples, Italy.

Travelling wave parametric amplifiers (TWPAs) recently became crucial tools in superconducting quantum technologies since they allow broadband and near quantum-noise-limited microwave detection, particularly useful for the readout of superconducting qubits. I will present the development and operation of a new TWPA device composed of a Josephson metamaterial with in-situ tunability and sign reversal of the Kerr nonlinearity: reversed Kerr TWPA [1].

In addition, I will show recent experimental results on the generation of two-mode squeezed states with such a device [2] and discuss the exciting perspective of using TWPAs as sources of multimode entangled states for microwave photonics experiments.

[1] Ranadive et al. “A reversed Kerr traveling wave parametric amplifier” (2021)
<http://arxiv.org/abs/2101.05815>

[2] M. Esposito et al., “Observation of two-mode squeezing in a traveling wave parametric amplifier” (2021) <https://arxiv.org/abs/2111.03696>