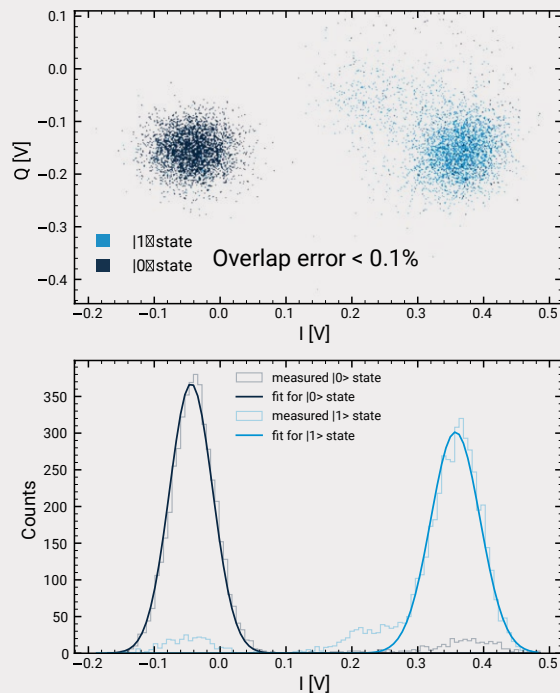


QUBIT MEASUREMENT

WITH TWPA

IQ DISTRIBUTION



Courtesy of V. Milchakov, C. Mori, and O. Buisson (UGA-CNRS, Institut Néel).

SERVICES

- **Warranty:** all devices come with a one-year off-site warranty.
- **Pre-study:** assessment of the measurement setup.
- **After sales:** 10h of remote assistance to help with the installation and setup of the TWPA.

PUBLICATIONS

- Planat et al., Phys. Rev. X 10, 021021 (2020)
- Ranadive et al., Nat. Com. 13, 1737 (2022)
- Esposito et al., Phys. Rev. Lett. 128, 153603 (2022)
- Esposito et al., Appl. Phys. Lett. 119, 120501 (2021)

A NEW GENERATION OF AMPLIFIERS ENABLING ULTRA-LOW NOISE MICROWAVE READOUT

We specialize in developing and manufacturing state-of-the-art quantum hardware using superconducting circuits for readout applications.

Our products are the result of years of intensive research.

Currently, we focus on the development of Josephson Traveling-Wave Parametric Amplifiers (JTWPA) for high-fidelity multiplexed qubit readout.



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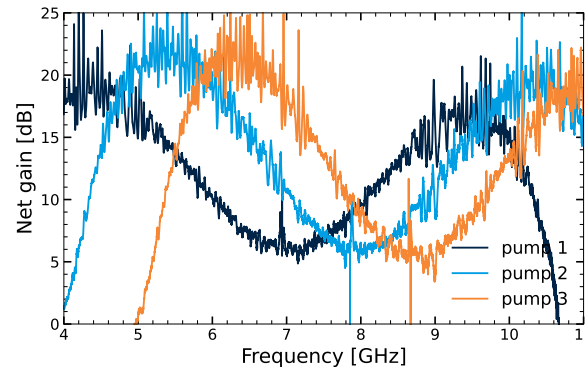
THE CARTHAGO

REVERSED-KERR
TRAVELING WAVE
PARAMETRIC AMPLIFIER

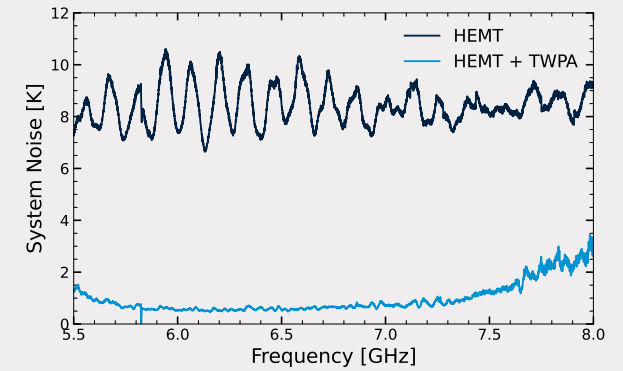
THE CARTHAGO

Designed to offer an exceptionally broad bandwidth with in-situ tunability, the Carthago is an ideal choice for high-fidelity single-shot qubit readout at any frequency, making it a versatile tool applicable to a diverse range of experiments.

GAIN FIGURE



TOTAL SYSTEM NOISE



THE PRODUCT

- SMA compatible connectors
- 50 Ω matched
- In-situ tunability
- Low pump power
- Very wide bandwidth
- DC magnetic flux required

FIGURES OF MERIT



Max net gain
>15 dB



Bandwidth
4 GHz



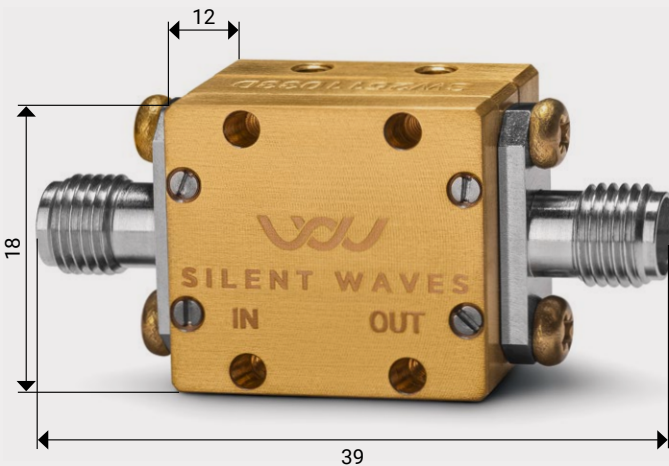
Saturation power
~ -105 dBm
(at 20 dB)



Added Noise
~ 1.5 SQL
(standard quantum limit)

The amplifier is powered by a microwave source and requires DC biasing of a superconducting coil.

To reach high gain over a bandwidth exceeding 2 GHz, it is essential to establish phase-matching among the pump, signal, and idler. To meet this requirement, we reverse the nonlinearity of the Josephson junctions by employing flux-biased asymmetric SQUIDs.



TUNABILITY

Gain from 4 to 10 GHz

CHARACTERIZATION

Full characterization performed at 20 mK.

Report of the characterization sent before shipment of the product.

SATURATION CURVES

