

Experimental investigation of local oscillator chains with GaAs planar diodes at cryogenic temperatures

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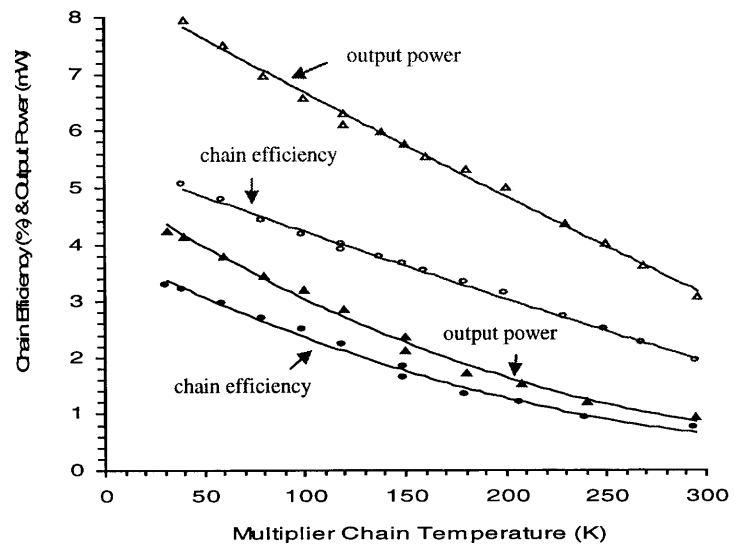
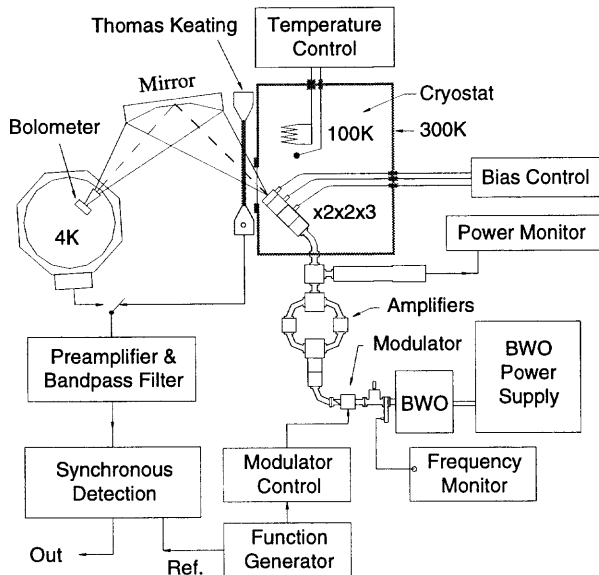
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ABSTRACT

A compact and robust cryostat based testbed has been designed and constructed (or built) that allows measurement of the performance of individual multiplier stages and multiplier chains at cryogenic temperatures. Power amplifiers in a power-combined configuration are used at the input to provide a signal at around 100 GHz. The output power of the multipliers is measured with a Thomas-Keating meter. A helium-cooled Si bolometer is included in the same setup to for fast tuning. This setup has been used to measure output signals from 200 to 1200 GHz consistently and repeatably.

The above mentioned setup has been used to make detailed measurements on balanced planar Schottky diode multipliers. A chain to 400 GHz (based on two cascaded balanced doublers) improves by more than 3 dB (in power and efficiency) as the temperature is decreased from 300 K to 50 K. A systematic analysis of the measured results will be presented in this talk.



Chain efficiency and output power for 382 GHz (red curve) and 402 GHz (blue curve)

Schematic of the cryostat testbed for measurement of multiplier performance