

Cryogenic electronics

Ultra-low noise high frequency amplifiers

Fraunhofer IAF develops ultra-low noise and compact high frequency electronics, among others for use in quantum computers. There, electronics used in close proximity to the qubits must not only be compatible with operation at extremely low temperatures, but also have extremely low noise and negligible heating. The lowest amplifier noise can be achieved with cooled amplifiers specifically designed for cryogenic operation (-270°C). InGaAs high electron mobility transistors (HEMTs) are the lowest noise transistors worldwide, making them ideal for these applications.

Features

- Record noise characteristics
- Limited power budgets
- Metamorphic high electron mobility transistors (mHEMTs)
- Monolithic integrated circuits (MMICs)
- Material system (InAlAs/InGaAs) on 4" GaAs substrates

Applications

- Quantum computing
- Radio astronomy
- Space communications
- Climate and earth observation from space
- High performance computing systems

Kryo-on-wafer measuring station with test structures applied to the cold plate and two probe arms
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