Pitt Research

Western Pennsylvania Quantum Information Core

Oxford Triton DR200 Dilution Refrigerator

The Oxford Triton DR200 dilution refrigerator is a cryogen-free (dry) dilution refrigerator designed for ultra-low-temperature experiments. It uses a 4 K pulse tube refrigerator (PTR) as its primary cooling mechanism and achieves base temperature down to ~20 mK.

The system supports both DC and RF measurement (4-12 GHz) capabilities and is equipped with a superconducting magnet providing magnetic fields up to 7 Tesla, making it suitable for quantum materials and device research.

System Specification:

- Base temperature: 20 mK
- Magnetic field: 7 T
- Cooling mechanism: 4K PTR, liquid cryogen free
- Cooling power: ~ 200 μW at 100 mK
- Sample space: 25 cm diameter, 28 cm height

AC/DC Measurement (Fridge Wiring Setup)

- Measurement lines: 48
- Home-made low pass RC filters
- Home-built copper powder filters

RF Measurement (Fridge Wiring Setup)

- Input line: 6 cables (up to 18 GHz, attenuation configurable)
- Output line: 2 cables
- Each output line includes:

One dual junction isolator (4-12 GHz)

One low temperature HEMT amplifier (0.3-14 GHz)

- Calmont cables for electrostatic gating: 4 cables
- Microwave filter: configurable upon request

Measurement Electronics

- **AC/DC transport measurement**

➢ Lock-in amplifier (AC transport measurement)

➢ IVVI system (DC transport measurement) includes:

Tunable current/voltage sources

Room temperature amplifier

➢ Keithley multimeter

➢ Integration of user-provided devices is supported

- **RF measurement**

➢ Vector Network Analyzer (Keysight P5005A): 900 kHz to-26.5 GHz

➢ Signal generator (Keysight N5183B): 300 kHz to-20 GHz

➢ RFSoC: 4 RF ADCs and 2 RF DACs

➢ Integration of user-provided devices is supported