



## Physical Property Measurement System

# PPMS



The Excellence Center for Novel Materials and Universidad del Valle have made their efforts concrete in obtaining a system of technological utility denominated PPMS, which permits conducting measurements of the physical properties of materials. This is a time-saving tool for efficient scientific research. We welcome a new stage in novel materials research in Colombia.

### WHAT IS THE PPMS?

The PPMS (Physical Property Measurement System) corresponds to a system of forefront technology built by Quantum Design™ (QD) for materials characterization. The objective of the system is that of making measurements on a variety of samples (pellets, powder, monocrystals, thin film, etc) on a broad range of temperatures in applied magnetic field. The system's open architecture feature allows autonomous control for all measuring parameters. It is a versatile laboratory instrument, which adapts easily to most experiments carried out at low temperatures.

The PPMS system can be organized to conduct measurements of: heat capacity, magnetometry, and applications of thermal and electric transport, among others.

Furthermore, the equipment's potential lies in that different types of measurements can be done simultaneously, which permits addressing different researcher needs.

### EASE OF USE

Each configuration adopted by the system takes only a few minutes to carry out. The PPMS is designed to work 24 hours per day, 7 days per week. The versatility of our PPMS equipment permits the following measurements within a temperature range from 1.9 to 400K in magnetic fields to 7 Tesla:

### DC RESISTIVITY

Range of current: 5 nA to 5 mA  
Sensitivity: 20 nV

### AC TRANSPORT (ACT)

Range of current:  $10 \mu\text{A}$  at 2 A  
Sensitivity: 1nV @ 1 KHz  
Frequency Range: 1 Hz at 1 KHz  
Types of measurements: resistivity, Hall coefficient, I-V curves, critical current

## DC/AC MAGNETIZATION (VSM, ACMS)

Temperature Range: 1.9 – 350 K

AC Frequency Range: 10 Hz at 10 KHz

AC Field Width Range: 2 mOe at 15Oe

Sensitivity:

DC magnetization measurements:  
2.5x10<sup>-5</sup> emu at 5 emu (2.5x10<sup>-8</sup> Am<sup>2</sup> at 5x10<sup>-3</sup> Am<sup>2</sup>)

AC susceptibility measurements: 2x10<sup>-8</sup> emu (2x10<sup>-11</sup> Am<sup>2</sup>) @ 10 KHz.

## THERMAL TRANSPORT (TTO)

Pressure: High Vacuum (~10<sup>-4</sup> Torr)

Temperature: 1.9 – 390 K

Field: 0 – 7 Tesla, when T > 20 K

Types of measurements: Thermopower (Seebeck coefficient), thermal conductivity, electrical resistivity, thermo-electrical figure of merit.

## HEAT CAPACITY (HC)

Pressure: High Vacuum (~10<sup>-4</sup> Torr)

Sample weight: 1 - 200mg

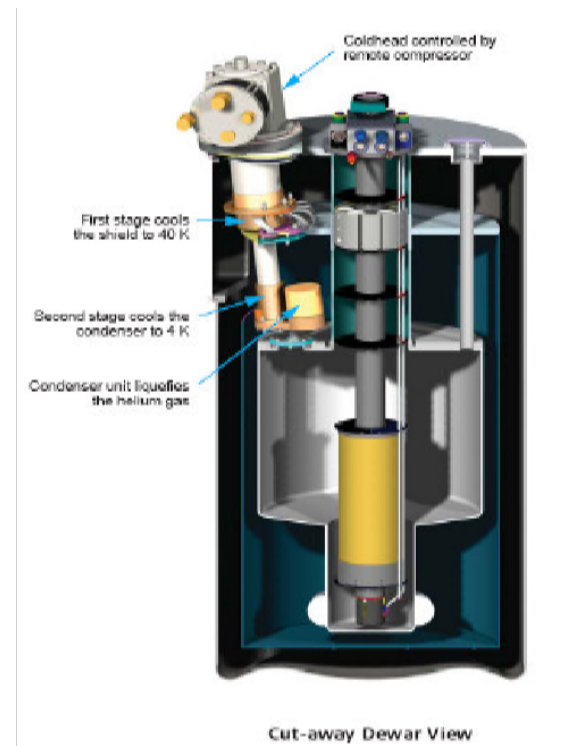
Sensitivity: 10 nJ/K at 2 K

## CHARACTERISTICS

In essence, the instrumental system of the QD PPMS consists of a control console with all the electronics, a liquid He refrigerated “Dewar”, and the assembly for the Cryogenic Probe.

Our equipment is also outfitted with the “Evercool” system designed by Sumitomo™, which permits keeping the levels of liquid He at stable conditions, continuously supplying gaseous He to the system.

The PPMS is run through a MultiVu Windows platform that controls all the essential functions for each of the measurements carried out by the equipment. This software facilitates the creation of measurement sequences, making the PPMS completely autonomous; while permitting the accurate control of each measurement parameter like: magnetic field, temperature, etc. Additionally, the software can be set up for real-time measurement supervision via internet.



## INFORMATION

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