

AC Susceptibility for Dilution Refrigerator (AC DR) (PPMS®/DynaCool™)

The AC Susceptibility Option for the Dilution Refrigerator (AC DR) brings the easy usability of the ACMS II option into the milli-Kelvin temperature range. Thermally anchoring the coil set to the puck interface rather than the DR sample stage, and using superconducting wires for the drive coils, lead to there being virtually no heat load on the DR. This allows mutual induction-based determination of the AC susceptibility of samples for frequencies between 10 Hz and 10 kHz down to 50 mK. Sophisticated software algorithms allow for automatic background removal and unprecedented phase accuracy in this temperature range.

Features

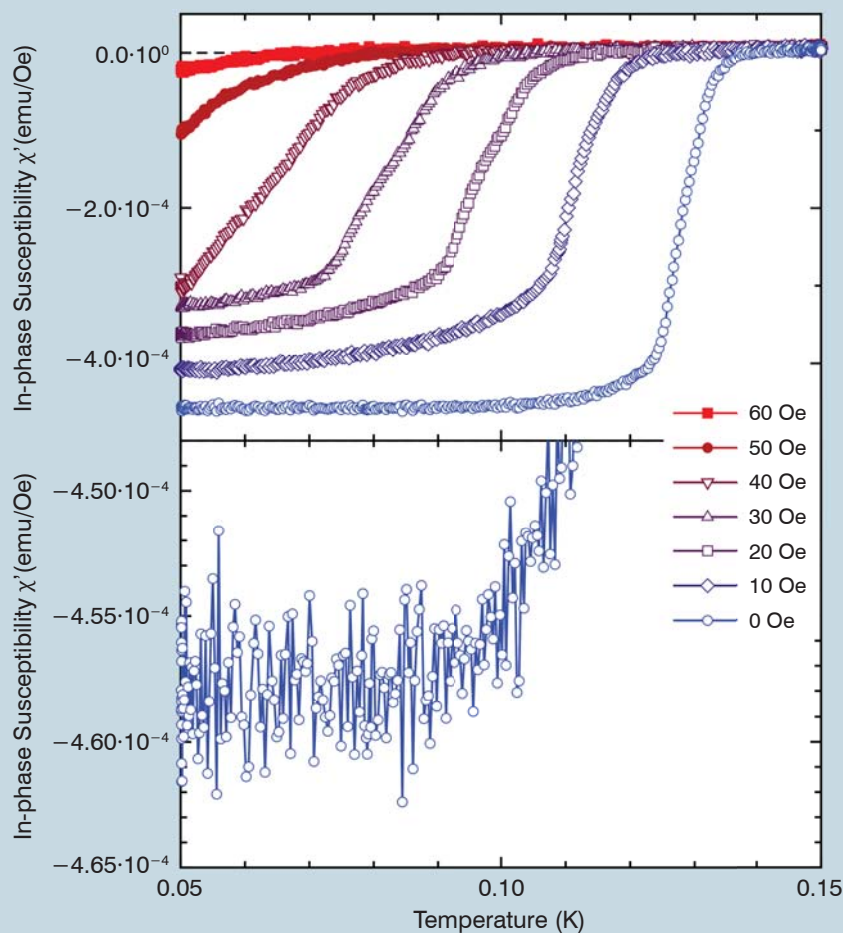
- Automated AC Susceptibility measurements between 10 Hz and 10 kHz
- Automatic background removal results in accurate phase information
- Temperature range 50 mK to 4 K, DC fields up to 12 T
- Sapphire sample stages (for parallel and perpendicular sample mounting)



DR Probe with AC DR Sapphire Sample Stage



AC DR Coil Set



In-phase susceptibility for the superconducting transition of an $\text{Ir}_{1-x}\text{Ru}_x$ sample measured using an AC excitation of 10 mOe and a frequency of 10 kHz for various DC background fields. The lower graph highlights the noise level for the zero field data. The peak to peak scatter of the data is about 5×10^{-6} emu/Oe, corresponding to 5×10^{-8} emu in absolute signal.

(Sample provided by Milton S. Torikachvili of San Diego State University)

Specifications

Model	P860, D860
AC Susceptibility:	
Drive Amplitude:	0.002 Oe to 4 Oe (peak)
Sensitivity @ 10 kHz*:	5×10^{-7} emu
Phase Accuracy:	$\pm 2^\circ$
Frequency Range:	10 Hz to 10 kHz
DC Field Range:	Up to ± 12 T
Temperature Range:	50 mK to 4 K

PPMS EverCool DynaCool VersaLab

* Expect an order of magnitude decrease in sensitivity for every order of magnitude decrease in drive frequency.

Andreas Amann, Manivannan Nallaiyan, Luis Montes, Alan Wilson, and Stefano Spagna.
 "Fully Automated AC Susceptometer for Milli-Kelvin Temperatures in a DynaCool PPMS."
 IEEE TRANSACTIONS ON APPLIED SUPERCONDUCTIVITY 27, no. 4 (2017): 3800104.



Quantum Design, Inc.
 10307 Pacific Center Court, San Diego, CA 92121
 Tel: 858.481.4400 Fax: 858.481.7410
www.qdusa.com • info@qdusa.com

Specifications subject to change without notice
 1091-007 Rev. A1 (April 2017)