Model SMM-401 nanoSQUID

The Tristan model SMM-401 is a powerful non-contact, scanning microscopy for imaging magnetic field distributions. The SMM-401 uses a superconducting SQUID sensor to provide outstanding spatial resolution and high sensitivity.

Features:

- 100 μm spatial resolution
- 1.4 pT/√Hz field sensitivity
- Room temperature sample
- 25 μm gap between sensor and sample
- Non-magnetic scanning stage
- Low helium consumption

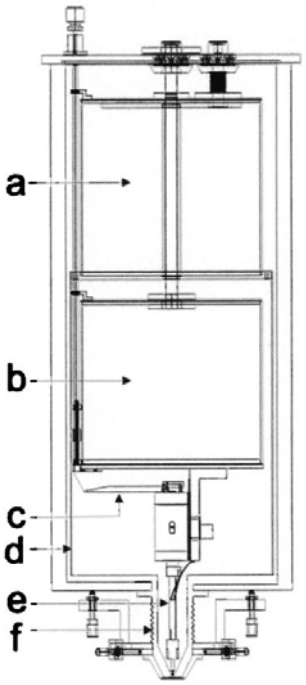
Applications

The SMM-401 is particularly useful in the areas where high sensitivities, especially at low frequency, are a requirement including Micropaleontology and Biomagnetism

Magnetic image of a homogeneously magnetized, 50 μm-thick geological thin section taken from the Martian meteorite ALH84001, and a line scan through the image showing a feature size of 120 μm. Courtesy of F. Baudenbacher *et. al*

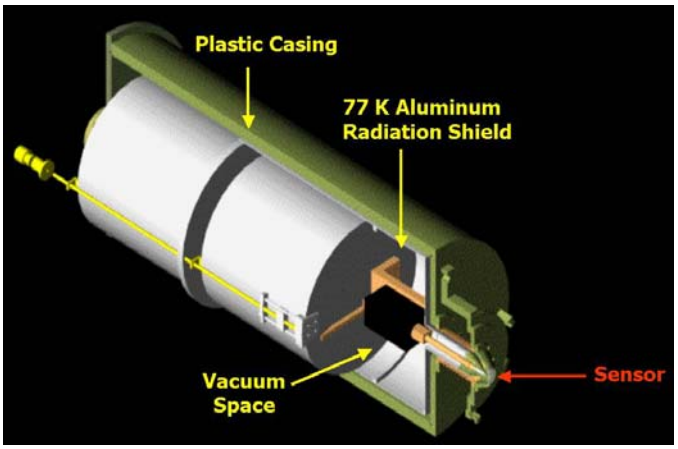
Magnetic microscopy image of a 1 mm by 2 cm by 1 cm slice of martian meteorite ALH84001, overlayed on top of a visual photo of the same slice. The colors give the field intensity, with red and yellow (blue) corre-sponding to upward (downward) magnet-ization. The fusion crust on the upper left side of the sample (visible as a thin black rind in the visual photograph) has been remagnetized in the Earth's field, while the interior of the meteorite retains the weaker, heterogeneous magnetism it acquired on Mars. *[Courtesy J.* Kirschvink*, Caltech]*

The magnetic field of the sample in the model SMM-401 is detected with a superconducting SQUID sensor. The sensing coil is mounted on the end of a sapphire rod keeping the superconducting sensor at liquid helium temperatures. The SQUID sensor is housed in the vacuum space of a cryostat behind a thin sapphire window and cooled through a thermal link to a liquid helium reservoir.



Cross section of Model SMM-401 SQUID microscope dewar: liquid nitrogen (a) and liquid helium (b) vessels, lever mechanism (c), liquid nitrogen-cooled radiation shield (d), cold finger (e), and bellows mechanism (f).

Careful thermal shielding assures reduction of the heat load allowing the sample is situated just below the sapphire window at bottom. The sample is scanned in close proximity to the window by a precision piezoelectric nonmagnetic scanning stage. High spatial resolution is obtained by directly detecting the sample's magnetic field (Figure **a** on the left).



Schematic representation of model SMM-401 microscope.