

Tristan Technologies, Inc.

animalSQUID™ Family of Systems

The **animalSQUID™** system is a set of research instruments made for functional brain mapping with animals or human neonates. Instruments can be tailor made in size, shape, sensor geometry for a variety of animals and experimental conditions.

The **SQUID** = **S**uperconducting **Q**uantum Interference **D**evice.

- Detects magnetic fields associated with cortical electrical activity
- Is preferentially sensitive to sulcal sources
- Has better spatial localization than scalp electrodes

Tristan's Model 607

Close-Spaced 7 Channel Dewar and Probe



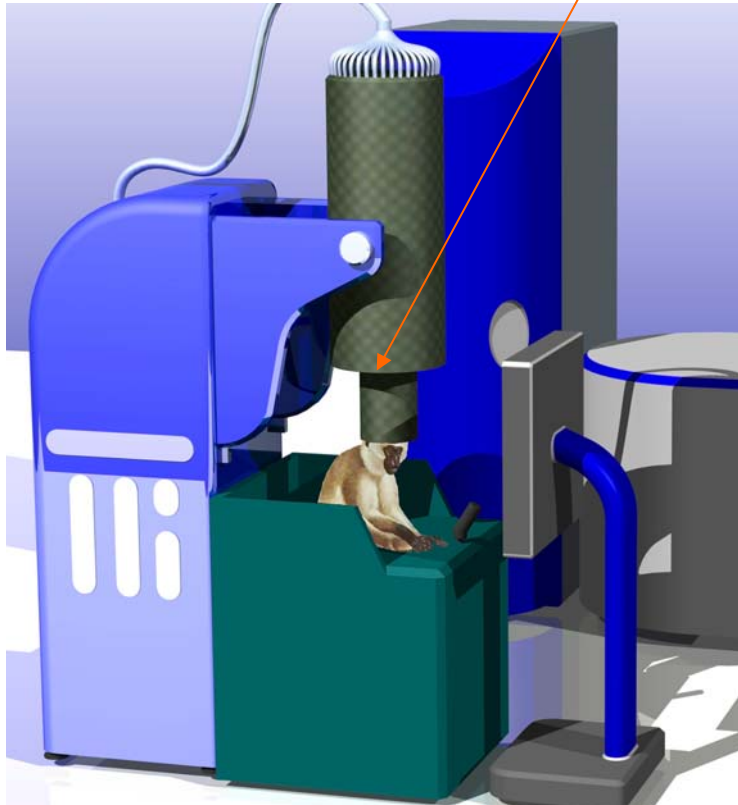
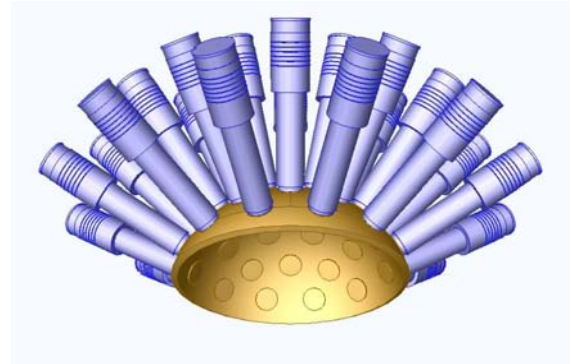
Sensor Configuration

- **2-mm** diameter **1st order** gradiometers with **1-cm** baseline
- **2 mm** coil-to-coil separation
- **2 mm** offset from room temperature outer dewar surface

monkeySQUID™

system for noninvasive cortical mapping of primates

37 Channel Array of SQUID sensors for Monkey Cortex



The **monkeySQUID™** System shown with visual display. Electronic rack and console are located outside of the magnetically shielded room, not shown.

- **Small gap puts sensors closer to cortical sources**
- **Mini-helmet molded to dimensions of monkey scalp**
 - **Higher channel count and whole-head coverage optional**
- **Reference channels to reduce ambient noise**

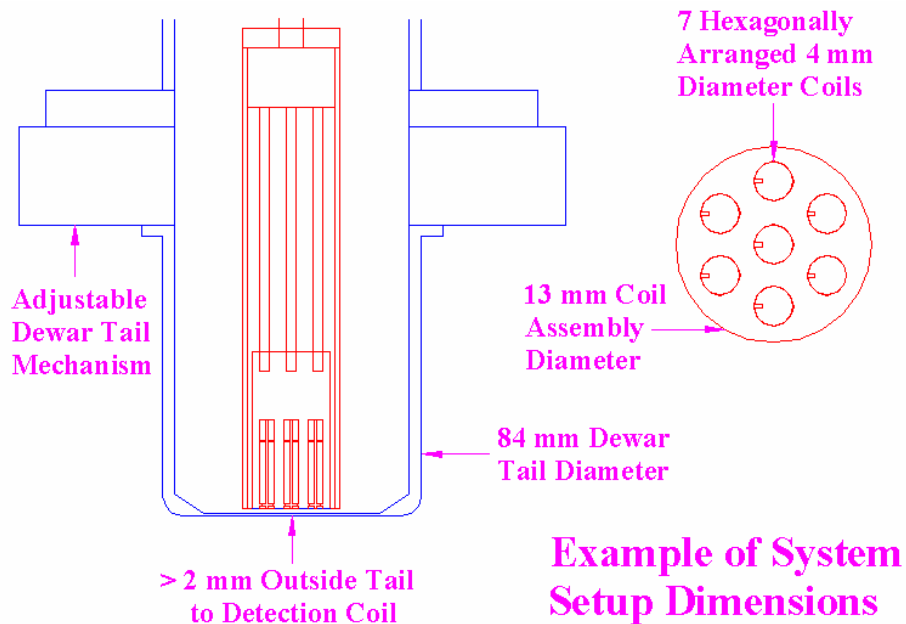
animalSQUID™ Features

Uses **microSQUID™** Technology to bring the sensor coils get very close to the subject to increase the signal/noise performance. Tristan is unique in its capacity to build thin "windows" between (cryogenic) sensor and (room temperature) source.

microSQUID™ Technology has been used to measure cortical sources in experimental animals such as rat, rabbit, pig, turtle, or monkey.

Sample Geometry

Close-Spaced model 607 Channel Probe



Design Options tailor **animalSQUID**TM to special applications ...

The combination of sensor array size, detector diameter, and channel count depends upon the area of coverage needed and the distance from cortical source to detector array. The design specifications are made for specific applications: (i.e. monkey or rat; intact or with craniotomy)

- **Number of detection coils:**

$N = 1, 4, 7, 19, 37, 61 \dots$ or higher

Hexagonally Closed Packed (HCP) Array

- **Diameter of sensor coils:**

Ranges from 1 mm to 10 mm

- **Number of reference channels (for noise reduction):**

$N = 4$ or 8

- **Gradiometer baseline:**

5 x sensor coil diameter

- **Sensor Geometries:**

Magnetometers, gradiometers (or both)

Vector coils (3-D)

- **Dewar tail diameter:**

Ranges from 2 cm to 10 cm

- **Spacing from sensor to room temperature:**

< 2 mm, (depending on detection coil diameter)

Use of advanced materials such as diamond and sapphire let us achieve very close spacing from sensors to cortex or scalp

animalSQUID™ System Components

Sensor Unit and Dewar

- Optional: Adjustable tail gap liquid helium dewar,
- Optional: Coils-in-vacuum design

Gantry (optional)

- Optional: Four degrees of freedom (X, Z, θ , ϕ)

SQUID Electronics

Data Acquisition Hardware

Data Acquisition and Analysis Software

animalSQUID™ System Advantages

- Use of advanced materials such as diamond and sapphire let us achieve very close spacing from sensors to cortex or scalp. Tristan Technologies' dewar tails have the smallest gap from sensor to room temperature.
- A choice of coil diameters, array sizes, and dewar geometry is available to the user, along with reference channels to reduce ambient noise, so that the **animalSQUID™** is optimized for specific animal measurements, in vitro studies, or neonatal studies.
- For basic research, **animalSQUID™** provides an opportunity to make *comparative* cortical measurements with other modalities, such as EEG, and EcoG, sequentially, or even simultaneously.

About Tristan Technologies

Tristan Technologies, Inc. is a commercial supplier of SQUID-based biomagnetic and laboratory instrumentation. Tristan Technologies designs and manufactures a wide range of SQUID-based laboratory, biomagnetic, geophysical and non-destructive evaluation (NDE) instrumentation. Tristan specializes in the rapid prototyping of complex sensing devices and data processing systems. Nearly half of Tristan's staff have advanced technical degrees, with more than a century's accumulated experience in cryogenics and superconducting technology. Tristan presently occupies an 8,300 square foot facility in the Sorrento Mesa area of San Diego. This location, near UCSD, provides easy access to unique manufacturing techniques and engineering expertise.

Tristan has made SQUID based Biomedical Systems to measure ...

- **Animal MEG**
- **Neonatal MEG**
- **Fetal Heart Rhythm**
- **Spinal cord (12 and 71-channel systems, high speed)**
- **Liver Iron Concentration**
- **Intestinal Ischemia**
- **Single muscle fiber**
- **Monitor metal/magnetic particle mobility or dispersion**

Contact Information

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