26th National Symposium on Cryogenics and Superconductivity

Contribution ID : 99

Testing different pick up coil configurations for SQUID sensor based Magnetocardiography(MCG) and Magnetoencephalography (MEG) studies

Content :

SQUID sensors are the most sensitive detectors of magnetic field available today with a sensitivity of ~10fT/√Hz which enable the measurement of extremely weak magnetic fields such as those associated with the physiological activities of the human heart; called as the magnetocardiogram (MCG) and those with the human brain; called as the magnetoencephalogram (MEG). There are a number of advantages in such measurements of magnetic activity (MCG / MEG) as opposed to the conventional measurement of electric activity (ECG / EEG). Electric signals that are measured by fixing electrodes on the skin surface are affected by the conductivity distribution of the tissues between the source and the measurement locations (which is often inhomogeneous and anisotropic, for example bones are poor electrical conductors) leading to distortions in the measured signals. This problem is of much less concern in magnetic measurements since most tissues are weakly diamagnetic and do not distort the measured magnetic field distribution. The magnetic measurement is contactless and gives complementary diagnostic information that is not contained in the electrical measurements.
Here we discuss different type of pick up coil configurations for the SQUID sensors used in the MEG and MCG measurements with magnetometers and gradiometers and their corresponding background noise. Different noise cancellation schemes, their applicability and limitations suitable for specific applications in biomagnetic field measurements are also discussed. The overall system noise floor is measured to be 12 fT/√Hz, for gradiometers and 20 fT/√Hz for the magnetometers, and both are adequate for the measurement of the biomagnetic fields in general. The details of these measurements are presented in the paper.

Primary authors : Dr. KATHOLIL, Gireesan (Indira Gandhi Centre for Atomic Research)

Co-authors : Mr. SENTHILNATHAN, Sengottuvel (Indira Gandhi Centre for Atomic Research) ; Mr. PATEL, Rajesh (Indira Gandhi Centre for Atomic Research) ; Mr. KHAN, Fayas (Indira Gandhi Centre for Atomic Research) ; Ms. PARIMITA SWAIN, Pragyna (Indira Gandhi Centre for Atomic Research)

Presenter : Dr. KATHOLIL, Gireesan (Indira Gandhi Centre for Atomic Research)

Session classification : --not yet classified--

Track classification : --not yet classified--

Type : --not specified--