

61-Channel Magnetocardiography System in Magnetically Shielded Room at Open Door

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We have installed 61-channel magnetocardiography (MCG) system inside a moderately magnetically shielded room (MSR) with a size of 2.4 m x 2.4 m x 2.4 m. The MCG system, consisting of 1st-order axial gradiometer double relaxation oscillation SQUID (DROSS) with a pick-up coil of a base line of 70 mm, has a noise level of 5 fT/Hz^{1/2} at 100 Hz. The MSR, constructed with a layer of 7 mm-thick aluminum sheet and 4 - 5 layers of 1 mm-thick permalloy sheet, holds a shielding factor of 50 at 0.1 Hz and 10000 at 100 Hz, whose door is located in the middle on a front wall. On opening the door in the MSR, we measure the output signals of the MCG system under the condition that the MSR is affected by a noise generated from an air conditioning unit at 13 m distance off the MSR. In the closed and locked MSR, a spark noise weakly appears when a relay in the air conditioning unit activates and a current starts to flow out, but the noise level of the MCG system doesn't change, which is continued until the door unlocks and opens up to 10 mm distance from the front wall of the MSR. When the door opens over 50 mm distance from the wall, the spark noise and the noise level increase in proportion to the distance. Therefore, the MSR with a slightly closed door without locking is enough to measure the human MCG, which results in being easy to handle the door.

Keywords: magnetocardiography, MSR, noise, SQUID