

Measurement of ^1H NMR in Water with SQUID Gradiometer

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We developed a low field NMR system by using a SQUID gradiometer. The SQUID gradiometer consists of the pick-up coil and the SQUID. The SQUID is a Double Relaxation Oscillation SQUID (DROS), which consists of a hysteretic signal SQUID, a reference junction, and shunted a relaxation circuit with a resistor and an inductor. The pick up coil is formed as second order gradiometer type and baseline of the pickup coil is 35 mm. The second order SQUID gradiometer showed about $8 \text{ fT}/\sqrt{\text{Hz}}$ at 100 Hz in the magnetically shielded room (MSR). In addition, we adopted a current limiter was formed by Josephson junction array to cut off excessive currents which were generated by measurement coil and prepolarization coil. Using this system, we measured a ^1H NMR signal in water ($\approx 20 \text{ cc}$) under the measurement field of $100 \mu\text{T}$ and the prepolarization field of 5 mT and we could show a T_2^* of over 2 second and spectral resolution of 0.16 Hz.

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