

Wide-bandwidth SQUID Current Amplifier and Control Electronics for X-ray Microcalorimeter

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Wide-bandwidth SQUID current amplifier and its control electronics have been constructed for detecting pulse outputs of a superconducting microcalorimeter. The current amplifier made of a double relaxation oscillation SQUID (DROS) has a bandwidth of 1.2 MHz and typical white noise level of about $6 \text{ pA}/\sqrt{\text{Hz}}$. To increase the dynamic range of the current amplifier, flux-locked loop (FLL) has additional circuits to reset the integrator and to count reset numbers which present the number of passed flux. In this system, dynamic range covers from -65 mA to +65 mA. SQUID electronics are controlled by software to get the optimum FLL condition, and control the current to bias the transition edge sensor (TES). The electronics are shielded from the outside electromagnetic noises by using an aluminum case of 61 mm x 25 mm x 100 mm, and consist of 2 separate printed-circuit-boards for the current amplifier and control electronics, respectively. The system of wide-bandwidth SQUID current amplifier and its control electronics will be used in TESs for detecting photons such as UV and x-ray with high energy resolution.

Keywords : SQUID, current amplifier, flux-locked loop, superconducting microcalorimeter, TES