

Bit Error Rate Measurement of an RSFQ Switch by using an RSFQ XOR

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The measurement of Bit Error Rate (BER) is very important in digital electronics circuits. To make the credible superconductive arithmetic logic unit (ALU), a rapid single flux quantum (RSFQ) switch should have a very low error rate. In this experiment, we prepared two circuits placed in parallel. One was a 10 Josephson transmission lines (JTLs) connected in series, and the other was the same circuit but with an RSFQ switch placed in the middle of the 10 JTLs. We used a splitter to feed the same input signal to the both circuits. The outputs of the two circuits were compared with an RSFQ XOR to measure the error rate of the RSFQ switch. Since the JTLs had very wide margins, we assumed the error rates of the JTLs were much lower than the switch. We observed no error during the 4 hours operation at 500kHz and calculated the BER to be less than $1.38 \times 10^{-10}/\text{sec}$. We also observed no error during the 3 hours operation at 5MHz and calculated the BER to be less than $1.85 \times 10^{-11}/\text{sec}$.

keywords : bit error rate, XOR , switch, flux, quantum