

Current status and recent developments in superconductor RSFQ processor and system design

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Small designs based on rapid single flux quantum (RSFQ) circuit technology have already demonstrated operating frequencies ten times higher than those achieved with current CMOS technology. The challenge for ultra-fast, low-power RSFQ technology has always been not in reaching record-breaking logic speed but rather in creating balanced processor and system designs where the capabilities of RSFQ logic could be well matched with those of memory and cryo-to-room temperature interface circuits.

The new R&D program recently initiated in the United States plans to find and demonstrate viable solutions to many superconductor processor, memory, interface, and fabrication challenges. In this talk I will review the current state of the RSFQ processor and memory design in the United States and Japan. Also, I will discuss major directions and some preliminary results of the new superconductor technology development program in the U.S.