

Large-scale Superconductor Electronics: Opportunities and Challenges

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Abstract—Technology roadmaps for superconductor electronics (SCE) and quantum computing are under development within the framework of the International Roadmap for Devices and Systems (IRDS). Application needs are drivers for IRDS roadmaps. Most important for the future of superconductor electronics are large-scale applications requiring more than one million switching devices per chip. Potential large-scale applications are evaluated in areas including digital signal processing, quantum computing, neuromorphic computing, and digital computing. Technology improvements required to meet the expected needs are assessed along with time scales for development.

Keywords (Index Terms)—Digital, Quantum Computing, Josephson Junction, Neuromorphic computing

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