

Physical Design Automation for Superconducting Qubits

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Abstract—The physical design of superconducting quantum processors entails managing competing demands. We seek to decrease the time required to deliver layout artwork while also satisfying a growing set of requirements, for example in frequency targeting and loss budgeting. In this talk we describe our approach in physical design automation at the AWS Center for Quantum Computing to address these competing demands. We have developed Palace, an open-source 3D finite element method-based electromagnetics solver that scales well on AWS. For mesh and layout artwork generation, we have developed the open-source DeviceLayout.jl library. Together with a workflow orchestration platform and high-performance computing environment, these tools enable the application of design optimization techniques and leverage available computational resources ahead of device fabrication and testing.

Keywords (Index Terms)—Quantum Computing, Qubit, Transmon, Nanofabrication, Microwave Device, RF, Josephson Junction