Automated Mapping Methods for the IBM Transmon Devices

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***Abstract*— Quantum computing and quantum information processing devices are becoming a reality. As a direct result of this new technology, there is a demand for methods that allow the automated translation of quantum processing algorithms into forms consistent with emerging device libraries. Quantum circuits in their original form may not always be compatible with a technology platform, so they must be transformed into technology-dependent models to be executed on a real quantum machines. This synthesis procedure must consider operational constraints of the physical quantum implementation such as the maximum number qubits, the available gates, and the connectivity between qubits for multi-qubit operations. In this work, algorithms that assist in technology-dependent quantum circuit mapping in the case of limited qubit connectivity will be explored. The IBM Q devices are the example target technology, and the CNOT operation is the multi-qubit gate with limited configurations for implementation.**