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*Programmable quantum circuits*

Many quantum circuits are designed to accomplish a single task, such as approximate cloning or teleportation. It is often useful to have more versatile circuits that can perform many tasks. Such a circuit has two inputs, data and a program, both of which are quantum states. The data has an operation performed on it, and the program controls what the operation is. If the circuit is to be able to perform an infinite number of operations with a finite-dimensional program space, it must be either probabilistic or approximate. That is, it either succeeds only part of the time, or the operations are performed to some level of approximation, and not exactly. The operation of probabilistic and approximate programmable circuits will be discussed.