SHARP AND APPROXIMATE QUANTUM COMPUTATIONAL LOGICS

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Quantum computational logics (**QCL**s) are new forms of quantum logic, that represent a natural logical abstraction from the theory of logical gates in quantum computation ([1]). In these logics formulas denote quantum information quantities (qubits, quregisters or mixtures of quregisters), while the logical connectives are interpreted as special quantum logical gates (unitary operators of convenient Hilbert spaces). As a consequence, any formula can be regarded as an economical description of a quantum circuit ([2]). The standard semantics of **QCL**s does not take into account any approximation methods, which instead play an important role in a number of quantum computational problems ([4], [3]). We investigate a class of new **QCL**s, called *approximate quantum computational logics* (**ApQCL**s), where the notions of *truth* and of *logical consequence* essentially depend on an approximation-degree. One can prove the existence of uncountably many **ApQCL**s that are mutually incomparable.

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