Quantum Computing from Addition-rule-based Cellular Automata CHENG WU, Missouri Univ of Sci & Tech — We argue that addition rules must be imposed first for a general-purpose quantum computing. This brings the addition operation into the architecture of one-dimensional cellular automaton with dual bits per cell. The four symbolic substitution rules are transformed into a 16 specific right-nearest-neighbor cell-to-cell rules. Thus addition operation is only one set out of roughly 4.3 billion available sets to be found in the cellular automaton. When the half-adder fundamental processors are wired together differently and become addition-rule incompatible, gliders or oscillations between two configurations will result as a new kind of science. Those examples as well as the cellular automaton's connection to the main-stream qubit approach will be presented and discussed.

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