**QUANTUM HAMILTONIAN SINGLE MOLECULE LOGIC GATES**

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**Abstract:**

Without embedding molecular wire, rectifier, switch, transistor chemical groups in a single molecule and without using qubits along its electronic quantum structure, a Quantum Hamiltonian Computing (QHC) designed molecule-logic gate can calculate in a quantum way with direct classical data inputs [1]. For the inputs, the classical to quantum conversion occurs directly on the molecule chemical board structure using for example the picometer precision of a low temperature scanning tunneling microscope (LT-UHV-STM) to input the classical data using single metal atoms. Also, with an LT-UHV-STM, the atomic scale quantum measurements used along this board to measure the logical output will also be described [2]. The quantum graph for designing QHC gates will be given leading for example to a very simple 6 quantum states QHC Boolean ½ adder gate [3,4]. QHC NAND, NOR and XOR single molecule gates [5,6,7] and a QHC surface NOR/OR atomic scale circuit on Si(100)H [8] have been experimentally demonstrated and more recently a single molecule full digital adder [9]. The advantages and limitations of the QHC quantum control approach in term of calculating power, clock frequency and interconnects will be discussed in comparison with the qubit computing approach [3]

**References:**

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