Title: ***Quantum information processing and beam diagnostic with single electron devices***

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Implementation scheme for electrostatic quantum computer is given with reference to recent cryogenic single-electron(s) CMOS technologies [1-4]. Particular attention is paid to sensing of moving charge what has its importance in accelerator beam diagnostics. Analytical and numerical solutions describing quantum gates and weak measurement are provided with a use of tight-binding approximation model and Schroedinger formalism [5-8]. The implementation scheme for quantum networks is given in the framework of CMOS technology. Decoherence effects occurring in electrostatic qubits and quantum gates are described analytically for two interacting electrons confined by local potentials with a use of tight-binding simplistic model and in Schrödinger formalism with an omission of spin degree-of-freedom [8-9]. The concept of CMOS programmable quantum matter with built-in quantum sensors is discussed. At very end the concept of quantum AI is introduced with particular attention focused on programmable quantum neural network. The perspective of usage of quantum chips for quantum sensing in CERN experiments is given with first analytical and numerical results with reference to recent technological frontiers [10-13].

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