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Quantum Dot Quantum Computation

I will give an overview of the research on spin-based quantum dot quantum computation, which covers two most prominent architectures, one based on GaAs quantum dots, the other on phosphorus donors in Si. Particular topics include the electron spin coherence in GaAs and Si, the conditions for the Heisenberg Hamiltonian to be a satisfactory description of two-electron interaction in a GaAs double dot, the possibility of using multi-electron quantum dot for quantum computing, the implication of bandstructure in case of Si, schemes of spin detection, schemes to measure single electron properties in ensemble-averaged experiments, and other related issues. I will also discuss the current status of research in several experimental fronts that are related to quantum dot quantum computing.