

Introduction to QC hardware in solid state systems

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Abstract: Quantum computing (QC) has become a popular research field worldwide, and that at present, major QC hardware systems can be classified into superconducting qubits, quantum dots, trapped ions, photons, topological qubits – all are researched by teams all over the world. In this talk, I will briefly introduce the operation principles of QC hardware in solid state systems (i.e., superconducting qubits, quantum dots and topological qubits). After this brief overview, I will talk about an emerging field in superconducting qubit which involves Integrating semiconductor/2D materials with superconducting circuits. In particular, topological materials, for their topologically protected surface and edge states which can serve as a robust channel to carry supercurrent, are also promising candidates for use in 2D materials-based quantum computing devices. In addition, the S-T-S junction (S is superconductor and T is topological material) naturally provides a platform to explore the physics associated with Majorana bound states (MBS). If time permits, I will also review this field and talk about some recent developments including our own works.