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CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS

Novel semiconductor-based superconducting qubits

Following the demonstration of semiconductor-based Josephson junctions which are fully tunable by electrical means, new routes have been opened for the study of hybrid semiconductor–superconductor qubits. These include semiconductor-based transmon qubits, superconducting spin qubits based on Andreev levels and fault-tolerant topological qubits based on Majorana zero modes. In my talk, I will review recent progress in the path toward such hybrid qubit designs with focus on semiconducting nanowires and quantum dot platforms.