Joint Annual Meeting of the Swiss and Austrian Physical Society 2023



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Type: Talk

[807] Quantum computing with hole spin qubits in silicon and germanium quantum dots.

Thursday 7 September 2023 16:00 (15 minutes)

Hole spin qubits are promising for large-scale quantum computers because of their large spin-orbit interaction (SOI).

I will present schemes to engineer SOI, optimizing quantum information processing. Large SOI mediates strong and tunable coupling between spins and photons, that can be engineered to be longitudinal. This coupling enables exact protocols for fast high-fidelity two-qubit gates that work at high temperatures.

However, SOI couples the spin to charge noise, causing decoherence. I will discuss qubit designs presenting sweet spots where noise is completely removed. In certain devices, the noise caused by hyperfine interactions with nuclear spins is also strongly suppressed, greatly enhancing coherence, and reducing the need for expensive isotopically-purified materials.

Theoretical Work

Theory

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