Sweet holes for quantum computing

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Hole spins in semiconductor quantum dots are emerging as a promising candidate for the realization of scalable spin-qubit architectures. Following an introduction to the field, I shall present recent advances in the development of hole-spin qubits. In particular, I shall present our results on single-hole spin qubits in foundry-compatible Si-MOS devices: from the discovery[1] and further in-depth investigation (unpublished) of operational sweet spots maximizing hole-spin coherence to the first demonstration[2] of a strong-coupling between a hole-spin and a microwave photon in a superconducting resonator. I shall conclude with an outlook on hole devices made from Ge/SiGe heterostructures, an emerging platform offering a unique combination of attractive properties[3].

References

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3. Scappucci et al., Nat Rev Mater 6, 926 (2021). https://doi.org/10.1038/s41578-020-00262-z