

Theoretical Quantum Physics

Group Seminar

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Orbital and electronic entanglement in quantum teleportation schemes

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Abstract

With progress towards more compact quantum computing architectures, fundamental questions regarding the entanglement of indistinguishable particles need to be addressed. In a solid state device, this quest is naturally connected to the quantum correlations of electrons. Here, we investigate the entanglement between electrons, focusing on the difference between the entanglement of modes and the entanglement of particles. We elucidate the formation of mode and particle entanglement in strongly correlated materials and show that both represent important resources in quantum information tasks such as quantum teleportation. To this end, we qualitatively and quantitatively analyze the entanglement in three electronic teleportation schemes: (i) quantum teleportation within a molecule on graphene, (ii) a nitrogen-vacancy center and (iii) a quantum dot array.

