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Quantum devices in graphene

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Abstract

Electrostatically defined quantum dots in bilayer graphene offer a promising platform for spin qubits with presumably long coherence times due to low spin-orbit coupling and low nuclear spin density. We employ a capacitively coupled charge sensor to study the time dynamics of the excited state using the Elzerman technique. We find that the relaxation time of the excited state is of the order of milliseconds. We perform single-shot readout of our two-level system which is an important step for developing a quantum information processor in graphene.

We also present quantum devices fabricated on magic-angle-twisted bilayer graphene and demonstrate operation of a Josephson junction and a SQUID.

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Orateur: Prof. ENSSLIN, Klaus (Solid State Physics Laboratory - ETH Zurich)

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