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Pulse gating on graphene quantum dots CHRISTIAN VOLK, CHRISTOPH NEUMANN, SEBASTIAN KAZARSKI, STEFAN FRINGES, STEPHAN ENGELS, BERNAT TERRES, JAN DAUBER, STEFAN TRELLENKAMP, UWE WICHMANN, CHRISTOPH STAMPFER, JARA-FIT and II. Institute of Physics B, RWTH Aachen, Aachen and Peter Gruenberg Institut (PGI-8/9), Forschungszentrum Juelich, Juelich, Germany — Graphene quantum devices have received increasing attention over the last years. Graphene quantum dots (QDs) are interesting systems for implementing spin qubits. Compared to well-established GaAs-based QDs, their smaller hyperfine and spin-orbit coupling promises more favorable spin coherence times. However, while the preparation, manipulation, and read-out of single spins have been demonstrated in GaAs, research on graphene QDs is still at an early stage. Although Coulomb blockade phenomena and excited state spectroscopy is now well established, experimental signatures allowing the identification of relaxation times have been hard to trace. Here we report on the current status of pulse gating experiments on graphene quantum devices and in particular we will present measurements of the charge relaxation rates in single-layer graphene QDs. The investigated devices consist of an island with a diameter of 120 nm, 4 lateral graphene gates and 2 charge detectors. From so-called diamond measurements we extract a charging energy of 11 meV and excited state level spacings on the order of 2-4 meV. The gates allow to individually tune the tunnelling-in and -out rates down to low MHz regime. Low-bias pulse gate measurements allow finally to extract relaxation rates on the order of 50 ns.

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