Spin relaxation in graphene quantum dots GUIDO BURKARD, PHILIPP STRUCK, University of Konstanz, Germany — With its low concentration of nuclear spins and relatively weak spin-orbit coupling, graphene is a promising host material for electron spin qubits. We have calculated the spin relaxation time $T_1$ of a single spin in graphene quantum dots [1,2] as a function of the externally applied magnetic field $B$. We find that in quantum dots without coupling between the valleys $K$ and $K'$ in the graphene band structure, there is an effective time-reversal symmetry breaking which prevents the Van Fleck cancellation at $B = 0$ known from semiconductor quantum dots. In combination with the lower dimensionality of the phonons in graphene, this leads to a distinct value of the exponent $\alpha$ in the power law $T_1 \propto B^\alpha$ which can be different from the value for semiconductor quantum dots.