

Abstract Submitted  
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**Hyperfine-induced valley mixing and the spin-valley blockade in carbon-based quantum dots** ANDRAS PALYI, GUIDO BURKARD, Department of Physics, University of Konstanz, Germany — Hyperfine interaction (HFI) in carbon nanotube and graphene quantum dots is due to the presence of  $^{13}\text{C}$  atoms. We theoretically show [1] that in these structures the short-range nature of the HFI gives rise to a coupling between the valley degree of freedom of the electron and the nuclear spin, in addition to the usual electron spin-nuclear spin coupling. We predict that this property of the HFI affects the Pauli blockade transport in carbon-based double quantum dots. In particular, we show that transport is blocked only if both the spin and the valley degeneracies of the quantum dot levels are lifted, e.g., by an appropriately oriented magnetic field. The blockade is caused by four “supertriplet” states in the (1,1) charge configuration.

[1] A. Palyi and G. Burkard, <http://arxiv.org/abs/0908.1054> (accepted to PRB)

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