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The spin Drude weight in the spin-1/2 XXZ chain: a combined exact diagonalization and time-dependent DMRG study FABIAN HEIDRICH-MEISNER, LMU Munich, CHRISTOPH KARRASCH, UC Berkeley, JOHANNES HAUSCHILD, LMU Munich, STEPHAN LANGER, U Pittsburgh — Various theoretical approaches predict a finite Drude weight for spin transport in the gapless phase of the spin-1/2 XXZ chain, suggesting ballistic transport properties. We compute the Drude weight at finite temperatures with two approaches: Time-dependent density matrix renormalization group simulations and exact diagonalization. For the latter, we present a detailed comparison of different schemes of evaluating finite-size data, namely either in a grand-canonical ensemble or in a canonical one. We argue that the grand-canonical data, obtained from averaging over all subspaces with different magnetizations, have a more systematic finite-size dependence than the canonical one. The results for D(T) from exact diagonalization and tDMRG are in good quantitative agreement in the massless phase [1]. Financial support from the DFG through FOR 912 is gratefully acknowledged.

[1] Karrasch, Hauschild, Langer, HM, Phys. Rev. B 87, 245128 (2013)

Fabian Heidrich-Meisner
LMU Munich

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