Abstract Submitted
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Correlation amplitude and entanglement entropy in random spin chains[1] JOSÉ HOYOS, Duke University, ANDRÉ VIEIRA, Universidade Federal do Ceara, NICOLAS LAFLORENCIE, CNRS-Orsay, EDUARDO MIRANDA, Universidade Estadual de Campinas — Using strong-disorder renormalization group, numerical exact diagonalization, and quantum Monte Carlo methods, we revisit the random antiferromagnetic XXZ spin-1/2 chain focusing on the long-length and ground-state behavior of the average time-independent spin-spin correlation function $C(l) = \upsilon l^{-\eta}$. In addition to the well-known universal (disorder-independent) power-law exponent $\eta = 2$, we find interesting universal features displayed by the prefactor $\upsilon = \upsilon_o/3$, if l is odd, and $\upsilon = \upsilon_e/3$, otherwise. Although υ_o and υ_e are nonuniversal (disorder dependent) and distinct in magnitude, the combination $\upsilon_o + \upsilon_e = -1/4$ is universal if C is computed along the symmetric (longitudinal) axis. The origin of the nonuniversalities of the prefactors is discussed in the renormalization-group framework where a solvable toy model is considered. Moreover, we relate the average correlation function with the average entanglement entropy, whose amplitude has been recently shown to be universal. The nonuniversalities of the prefactors are shown to contribute only to surface terms of the entropy. Finally, we discuss the experimental relevance of our results by computing the structure factor whose scaling properties, interestingly, depend on the correlation prefactors.

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