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Random antiferromagnetic spin chains with enlarged symmetry

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— We present the asymptotically exact solution of some random antiferromagnetic spin chains with enlarged symmetry groups. Using a generalization of the strong disorder real space renormalization group method, we considered both the isotropic $SU(N)$ and the anisotropic $SU(4)$ chains with totally antisymmetric irreducible representations. In the first case, the system is governed by a universal infinite-randomness fixed point (IRFP), with activated dynamical scaling between energy (Ω) and length (L) scales $\Omega \sim \exp(-L^\psi)$ (with the tunneling exponent $\psi = 1/N$), and average correlation function decaying as a power law with exponent $\eta = 4/N$. All thermodynamic quantities are universal with exponents depending only on N . In the second case, relevant for systems with $SU(2)_{spin} \otimes SU(2)_{orbital}$ symmetry, we determined the full phase diagram as a function of the mean anisotropy and its variance. All stable fixed points are of the IRFP variety with activated dynamical scaling. The tunneling exponents span a wide range of values and can even be larger than the $SU(2)$ value, $\psi = 1/2$.

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