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 (\(\Omega\)) 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 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, \(\psi = 1/2\).