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Exact results for quenched disorder at criticality

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We show how an exact field theoretical replica method can be formulated for the study of two-dimensional systems with quenched disorder at criticality. For the q-state Potts model we obtain a solution which appears to solve longstanding theoretical and numerical puzzles about the disordered ferromagnet. The space of solutions with Potts permutational symmetry also accounts for strong disorder critical points such as the Nishimori point. All these solutions are found to exhibit superuniversal (i.e. symmetry independent) sectors.

References:

[1] G. Delfino,
Exact results for quenched bond randomness at criticality,
PRL 118 (2017) 250601.

[2] G. Delfino and E. Tartaglia,
On superuniversality in the q-state Potts model with quenched disorder,
arXiv:1709.00364, to appear in JSTAT.

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