Self-avoiding walk on random conductors

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Self-avoiding walk (SAW) on the d-dimensional integer lattice $\mathbb{Z}^d$ is a statistical-mechanical model for linear polymers in d dimensions. It also attracts much attention among QFT theorists, due to its super-symmetric representation and relation to the φ^4 model. It is known that the susceptibility, which is the sum of the two-point function, diverges as the energy-cost h for each bond joining consecutive monomers goes down to the critical value $h_0 \equiv \log \mu$, where μ is the connective constant. Suppose that the energy-cost is not homogeneous, but it is perturbed by bond-dependent random variables that describe the magnitude of resistance of a conductor attached to each bond. Then, the susceptibility becomes random and loses translation invariance, similar to the real polymer chains. A natural question would be to ask how the random perturbation affects the phase transition and critical behavior of SAW.

I will explain the recent results on SAW on random conductors and discuss future problems.