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*Exact value of the resistance exponent for four dimensional random walk trace.*

Abstract: Let $S$ be a simple random walk starting at the origin in $\mathbb{Z}^4$. We consider $\mathcal{G} = S[0, \infty)$ to be a random subgraph of the integer lattice and assume that a resistance of unit 1 is put on each edge of the graph $\mathcal{G}$. Let $R_n$ be the effective resistance between the origin and $S_n$. We derive the exact value of the resistance exponent; more precisely, we prove that $n^{-1}E(R_n) \approx (\log n)^{-\frac{1}{2}}$. Furthermore, we derive the precise exponent for the heat kernel of a random walk on $\mathcal{G}$ at the quenched level. These results give the answer to the problem raised by Burdzy and Lawler[1] in four dimensions.

[1]Burdzy, K.; Lawler, G. F.: Rigorous exponent inequalities for random walks. *J. Phys. A: Math. Gen.* **23** (1990): L23–L28.