Random walk on Galton-Watson trees

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CWe investigate simple random walks on infinite (Bienaymé–) Galton–Watson trees. The main focus is on the annealed return probability for these random walks. We prove that for all offspring distributions with finite first moment, the return probability decays subexponentially with power $t^{1/3}$ in the exponent, which is optimal whenever the offspring distribution does not forbid leaves or linear pieces in the tree. This complements the corresponding lower bound provided by Piau (1998). In the special case of a Poissonian offspring distribution, we apply this upper bound to deduce a Lifshits tail for the eigenvalue density of the graph Laplacian on supercritical sparse Erdös–Rényi random graphs.

Joint work with Peter Müller and Sara Terveer.