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Ising model on a Galton-Watson tree with a random external field.

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We study the Ising model on a Galton-Watson tree with a random external field, which can be interpreted as randomly introducing “interfering vertices” with a fixed spin. This model is motivated by the study of the Ising model on tree-like random graphs, which can serve as a framework for understanding cooperative behaviour in social networks. In joint work with Quentin Berger (Sorbonne Nord), we establish necessary and sufficient conditions for a phase transition in this setting. Our proof relies on both a beautiful tree-pruning technique and non-linear conductances on trees.

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