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Chiral transition, eigenmode localisation and Anderson-like models

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I discuss chiral symmetry restoration and eigenmode localisation in finite-temperature QCD by looking at the lattice Dirac operator as a random Hamiltonian. I will argue that the features of QCD relevant to both phenomena are the presence of order in the Polyakov line configuration, and the correlations that this induces between spatial links across time slices. This ties the fate of chiral symmetry and of localisation of the lowest Dirac eigenmodes to the confining properties of the theory. I then show numerical results obtained in a QCD-inspired Anderson-like toy model, derived by radically simplifying the QCD dynamics while keeping the important features mentioned above. The toy model reproduces all the important qualitative aspects of chiral symmetry breaking and localisation in QCD, thus supporting the central role played by the confinement/deconfinement transition in triggering both phenomena.

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