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Anderson localisation of Dirac eigenmodes in high temperature QCD

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We investigate the properties of the background gauge field configurations that act as disorder for the Anderson localization mechanism in the Dirac spectrum of QCD at high temperatures. We compute the eigenmodes of the M^{obius} domain-wall fermion operator on configurations generated for the $SU(3)$ gauge theory with two flavors of fermions, in the temperature range $[0.9, 1.9]T_c$. We identify the source of localization of the eigenmodes with gauge configurations that are self-dual and support negative fluctuations of the Polyakov loop P_L , in the high temperature sea of $P_L \sim 1$. The dependence of these observations on the boundary conditions of the valence operator is studied. We also investigate the spatial overlap of the left-handed and right-handed projected eigenmodes in correlation with the localization and the corresponding eigenvalue. We discuss an interpretation of the results in terms of monopole-instanton structures.

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