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Extended Dual QCD and its mass spectrum

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We investigate the framework of extended dual Quantum Chromodynamics (QCD), wherein confinement and mass generation are described through a dual superconducting model of the QCD vacuum. By extending the conventional dual QCD approach—typically centered on the Abelian projection and monopole condensation—we incorporate additional dual gauge degrees of freedom and scalar fields associated with an enriched dual symmetry structure. This allows for a more comprehensive treatment of color confinement and hadronization mechanisms. We compute the mass eigenvalues of both gauge and scalar sectors, revealing a non-trivial structure that includes glueball-like excitations and potential bound states. Our results provide insight into the dual Meissner effect, the role of topological solitons, and the phenomenological implications for glueball masses and confinement scales. These findings contribute to a deeper understanding of non-perturbative QCD dynamics and offer testable predictions for lattice simulations and future experiments.

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