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Center vortices and the emergence of a gluon mass scale

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Content

Lattice simulations and theoretical analyses consistently identify center vortices and monopoles as key nonperturbative configurations in Yang-Mills theory. Independently, studies of correlation functions reveal an infrared behavior characterized by massive-like scales. Yet, an open issue is how such correlators can arise in a confining regime characterized by a linearly rising potential rather than a Yukawa one. Using an Abelian projected vacuum wavefunctional peaked on chains formed by center vortices and monopoles, we compute gauge-invariant field-strength correlators. We show the emergence of a massive-like correlator constructed from the gauge-invariant two-point field strength observable. This behavior arises from the nonoriented soft component of the center-vortex condensate, the same hierarchical mechanism previously shown to produce the area law and Casimir scaling of string tensions.

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