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A geometric-phase stochastic approach to topology change in quark confinement

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Abstract. We apply a stochastic version of the geometric Ricci flow in order to explain the area-low of large Wilson-loops in Yang-Mills fields confinement. Confinement is therefore interpreted, within this stochastic geometric flow approach, as a geometric-phase by-product of the dynamics of Yang-Mills fields, being provided by the Aharonov-Bohm effect induced by the concatenation of the chromo-electric and chromo-magnetic fluxes. This dynamical (in thermal time) stochastic geometric-phase approach naturally accomplishes a treatment of the emergence of the vortices and the generation of turbulence effects, due to intermittency. The linking among dual chromo-magnetic and chromo-electric fluxes introduces topological charges over which the path-integral formulation of the non-perturbative theory can be expanded. Braiding and knotting, resulting from topology changes, namely stochastic fluctuations of the Einstein-Yang-Mills system, stabilize the chromo-magnetic vortices and induce, as non-trivial topological features, chiral symmetry-breaking.

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