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## Topological Data Analysis, Monopoles and Colour Confinement in $SU(3)$ Yang-Mills

*Friday, 2 August 2024 12:35 (20 minutes)*

Techniques derived from topological data analysis have been recently explored to study non-perturbative phenomena in lattice field theories in which configurations with non-trivial topology are expected or conjectured to play a central role. In this talk, we apply methods of topological data analysis to the investigation of the behaviour of Abelian monopole currents (defined in the Maximal Abelian Gauge) across the deconfinement phase transition of  $SU(3)$  Yang-Mills theory. In particular, we study the average number of connected components and the average number of cycles of these currents as a function of the temperature. Performing a finite size scaling analysis, we study the effectiveness of these observables and of the corresponding susceptibilities at identifying the critical temperature and reproducing the scaling properties of the expected first-order deconfinement phase transition. We conclude discussing the extension of the developed approach to QCD with dynamical quarks.

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