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Topological structure of the QCD vacuum at finite temperature

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The structure of the gluonic vacuum is examined at finite temperature in lattice QCD. The topological charge density on individual Monte Carlo gauge field configurations is calculated, and an algorithm is applied to detect topological objects associated with local extrema. These objects are found to have a distribution of fractional topological charge, and the nature of this distribution changes with the crossing of the critical temperature. Comparisons are made with model predictions, including an instanton-dyon model. The vortex content of these configurations is also studied after fixing to Maximal Centre Gauge. The dominant vortex cluster is observed to “melt” as the temperature crosses into the deconfined phase, causing a collapse in geometry such that centre vortices no longer percolate in all four dimensions.

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