

# High temperature non-Abelian chiral instabilities in a lattice effective field theory

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The question of whether anomalous, i.e. CP-odd effects, in QCD have been observed in relativistic heavy-ion collisions is a topic of current theoretical and experimental interest. Its solution requires a deeper understanding of how CP-odd domains with chiral imbalance  $n_5$ , if formed in the collision center, evolve in real-time.

Here we present recent results [1] on a new class of plasma instabilities so called chiral instabilities that may play a key role in the presence of finite  $n_5$ . We investigate their existence and dynamics in non-Abelian SU(2) gauge theory implemented via a Langevin-like anomalous effective field theory [2] on the lattice.  $n_5$  enters as a dynamical degree of freedom, driven by changes in topology.

We find that fluctuations in the gauge fields indeed initiate a rapid energy transfer into the magnetic degrees of freedom, while depleting the chiral imbalance. At the same time the topological charge, as helicity is conserved, shows a clear drift among vacuum sectors proportional to the initial  $n_5$ , as well as a significantly enhanced diffusion constant, i.e. sphaleron rate.

[1] Y.Akamatsu, A.R., N.Yamamoto, JHEP 1603 (2016) 210

[2] Y.Akamatsu, N.Yamamoto, Phys.Rev. D90 (2014) 125031

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