Contribution ID: **60**   Type: **Poster presentation**

Sphalerons on 4D Euclidean lattices

The aim of this project is to compute the strong sphaleron rate (the diffusion constant for the Chern-Simons topological number for quantum chromodynamics) on 4D lattices in a range of temperatures between 500 MeV and 3 GeV. This rate is important to understand the equilibration between axial quarks through the anomaly equations. Although this quantity has been previously computed in real-time lattices with Langevin dynamics, this only allowed to confidently access the very high temperature regime. Here, instead, we use a novel method in 4D Euclidean lattices that exploits the periodicity in the time direction, and the topological nature of the Chern-Simons number, and thus we extend the range of validity of the calculation to temperatures closer to those of interest in heavy ion collisions experiments.

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Session Classification: Poster session