



Contribution ID: 221

Type: **Parallel Talk**

Gauge field smearing and controlled continuum extrapolations

Friday, 4 August 2023 09:20 (20 minutes)

Two popular methods to reduce discretisation effects are Symanzik improvement and gauge field smearing in the Dirac operator. Tree-level $O(a^2)$ -improved Wilson fermions can be obtained from $O(a)$ -improved Wilson fermions by adding one dimension-6 operator to the action. For gauge field smearing one wants to avoid the situation when too much smearing leads to uncontrolled continuum extrapolations as the short distance behaviour is mutilated. We focus on the gradient flow formalism as it allows to study both smearing and physical flow. We investigate the effect of smearing on the scaling towards the continuum limit in pure gauge theory on the example of Creutz ratios, which provide a measure of the physical forces felt by the fermions. For suitable smearing strengths we also investigate the change when the Wilson gradient flow is replaced by stout smearing.

Topical area

Theoretical Developments

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Session Classification: Theoretical Developments