Solving $\mathrm{SU}(3)$ Yang-Mills theory on the lattice: a calculation of selected gauge observables with gradient flow

Hans Mathias Mamen Vege April 23, 2019

University of Oslo

Motivation

Structure

- Motivation
- $\cdot \ \mathsf{Quantum} \ \mathsf{Chromodynamics}(\mathsf{QCD})$

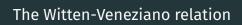
- Motivation
- Quantum Chromodynamics(QCD)
- · Lattice QCD

Introduction

Quantum Chromodynamics(QCD)

/.

Say hey



Lattice Quantum Chromodynamics(LQCD)

Discretizing spacetime

Pure gauge action



Developing a code for solving $\mathrm{SU}(3)$ Yang-Mills theory on the lattice

The numerical challenge in lattice QCD

The path integral

The Metropolis algorithm

Link sharing

Scaling

Measuring observables on the lattice

How to measure

Topological charge

Gradient flow

The flow equation

Solving gradient flow on the lattice

Smearing the lattice

Results

Ensembles

Energy and the scale setting

Topological charge

Topological susceptibility

The fourth cumulant

The topological charge correlator

The effective glueball mass

Conclusion