

1. Record Nr.	UNINA9910506375703321
Autore	Yanagihara Ryosuke
Titolo	Distribution of energy momentum tensor around static charges in lattice simulations and an effective model // Ryosuke Yanagihara
Pubbl/distr/stampa	Gateway East, Singapore : , : Springer, , [2021] ©2021
ISBN	981-16-6234-7
Descrizione fisica	1 online resource (170 pages)
Collana	Springer Theses
Disciplina	530.143
Soggetti	Yang-Mills theory Quantum chromodynamics Lattice gauge theories
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Intro -- Supervisors' Foreword -- Preface -- Acknowledgements -- Contents -- 1 Introduction -- 1.1 Quantum Chromodynamics -- 1.1.1 Asymptotic Freedom -- 1.1.2 Chiral Symmetry -- 1.1.3 Confinement -- 1.2 Flux Tube -- 1.2.1 Dual Abelian-Higgs Model -- 1.2.2 Dynamics of Strings -- 1.2.3 Lattice Approach -- 1.3 Phase Transition and Exploration of Deconfined Phase -- 1.4 Purpose -- 1.4.1 Lattice Study -- 1.4.2 Effective Model -- 1.5 Organization -- References -- 2 Energy Momentum Tensor -- 2.1 Derivation and Properties of Energy Momentum Tensor -- 2.1.1 Derivation and Properties -- 2.1.2 Physical Meanings -- 2.1.3 Example: Energy Momentum Tensor in Pure Gauge Theory -- 2.2 Energy Momentum Tensor in Maxwell Theory -- 2.2.1 Maxwell Equations and Classical System -- 2.2.2 Energy Conservation -- 2.2.3 Momentum Conservation -- 2.2.4 Maxwell Stress and Coulomb Force -- 2.2.5 Stress Distribution on Source Plane -- References -- 3 Lattice Field Theory -- 3.1 Feynman Path Integral -- 3.2 Lattice Regularization -- 3.2.1 Simple Example -- 3.2.2 Free Boson Field -- 3.2.3 Free Fermion Field -- 3.3 Lattice Gauge Theory -- 3.3.1 Gauge Principle and Gauge Field -- 3.3.2 Link Variable -- 3.3.3 Path Integral -- 3.3.4 Non-Abelian Gauge Theory on the Lattice -- 3.4 Gauge-Invariant Quantity on the Lattice -- 3.4.1 Wilson Loop -- 3.4.2 Polyakov Loop -- References -- 4 Yang-Mills Gradient Flow and Energy

Momentum Tensor -- 4.1 Quantum Theory of Yang-Mills Theory --
4.1.1 Action -- 4.1.2 Quantization -- 4.1.3 One-Loop Divergences --
4.1.4 Renormalization -- 4.2 Introduction to Gradient Flow -- 4.2.1
Idea of Yang-Mills Gradient Flow -- 4.2.2 Perturbative Expansion of
Gradient Flow -- 4.2.3 Example: Two-Point Function of Flowed Gauge
Field -- 4.3 Proof of Renormalizability of Gradient Flow -- 4.3.1 (D+1)-
Dimensional Field Theory.
4.3.2 BRS Invariance and WT Identity of (D+1)-Dimensional System --
4.3.3 Proof of Renormalizability -- 4.4 Application to Energy
Momentum Tensor -- 4.4.1 Small Flow Time Expansion -- 4.4.2
Renormalization Group Equation and Expansion Coefficients -- 4.4.3
Energy Momentum Tensor on the Lattice -- 4.5 Comments on Fermions
-- References -- 5 Distribution of Energy Momentum Tensor around
Single Static Quark in Deconfined Phase of SU(3) Yang-Mills Theory --
5.1 EMT around a Static Quark in SU(3) Yang-Mills Theory on the Lattice
-- 5.1.1 Correlation -- 5.1.2 Spherical Coordinate -- 5.2 Lattice Setup
-- 5.2.1 Gauge Configurations -- 5.2.2 Discretization Effect -- 5.2.3
Double Extrapolation -- 5.3 Results of EMT Distributions -- 5.3.1
Channel Dependence -- 5.3.2 Temperature Dependence -- References
-- 6 Distribution of Energy Momentum Tensor around Static Quark-
Anti-Quark in Vacuum of SU(3) Yang-Mills Theory -- 6.1 Wilson Loop
and $Q\bar{Q}$ Potential -- 6.1.1 $Q\bar{Q}$ Potential -- 6.1.2 Determination of
NAPE -- 6.2 Distribution of Energy Momentum Tensor around $Q\bar{Q}$
-- 6.2.1 Correlation -- 6.2.2 Cylindrical Coordinate -- 6.3 Setup -- 6.4
EMT Distribution on Source Plane -- 6.5 EMT Distribution on Mid-Plane
-- 6.5.1 Double Extrapolation -- 6.5.2 EMT Distribution on Mid-Plane
-- References -- 7 Distribution of Energy Momentum Tensor around
Magnetic Vortex in Abelian-Higgs Model -- 7.1 Stress Tensor and
Momentum Conservation in Cylindrical Coordinate -- 7.2 Abelian-
Higgs Model -- 7.2.1 Model -- 7.2.2 Energy Momentum Tensor in
Cylindrical Coordinate System -- 7.3 Magnetic Vortex -- 7.3.1
Magnetic Vortex with Finite Length -- 7.3.2 Infinitely Long Vortex --
7.3.3 Physical Units -- 7.3.4 Details of Numerical Analysis -- 7.4
Numerical Results -- 7.4.1 Infinitely Long Vortex -- 7.4.2 Finite-
Length Flux Tube -- References -- 8 Summary and Outlook --
References.
Appendix A Improved Estimator -- Appendix B Tree-Level
Improvement of Lattice Observables -- Appendix C Leading-Order
Perturbative Analysis of EMT around Single Static Charge -- Appendix
D Smearing Method -- D.1 SU(N) Projection -- D.2 APE Smearing --
Appendix E Analytic Properties of Abelian-Higgs Model.
