

# A Very Impressive and Fancy Tile for a Thesis

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THESIS

for the degree of

MASTER OF SCIENCE



Faculty of Mathematics and Natural Sciences  
University of Oslo

May 2018



# Contents

<b>I</b>	<b>Introduction to QCD and Lattice Field Theories</b>	<b>5</b>
<b>1</b>	<b>A Primer on QCD in the Continuum</b>	<b>7</b>
1.1	Derivation of the QCD Lagrangian . . . . .	7
<b>2</b>	<b>QCD on the Lattice</b>	<b>9</b>
<b>3</b>	<b>Pure Gauge Theories: a First Implementation</b>	<b>11</b>
<b>II</b>	<b>A QCD problem I should be considering</b>	<b>13</b>
<b>4</b>	<b>The nucleon EDMa?</b>	<b>15</b>
<b>III</b>	<b>Conclusion and Discussion</b>	<b>17</b>
<b>5</b>	<b>Summary and Conclusion</b>	<b>19</b>
<b>6</b>	<b>Future Developements</b>	<b>21</b>

# Abstract



# Acknowledgements



## Part I

# Introduction to QCD and Lattice Field Theories





## Chapter 1

# A Primer on QCD in the Continuum

Quantum Chromodynamics, commonly referred to as QCD, is the quantum field theory that describes the behaviour of strongly interacting matter, that is quarks and gluons. It is a non-abelian gauge theory based on a  $SU(3)$  symmetry group. In this chapter we will discuss how the QCD lagrangian density is obtained, how it links with the Standard Model of particle physics ( $SM$ ) and some of the major results of the theory. [1]

### 1.1 Derivation of the QCD Lagrangian

Starting from a complex fermion field  $\psi(x)$  we can construct a vector of  $N$  such fields. The case of the strong force is that of  $N = 3$ :

$$\psi(x) = \begin{pmatrix} \psi_a(x) \\ \psi_b(x) \\ \psi_c(x) \end{pmatrix} \quad (1.1)$$

We then construct a lagrangian density starting from Dirac's equation:

$$\mathcal{L} = i\bar{\psi}(\not{\partial} - m)\psi \quad (1.2)$$

Finally we have configured everything...



## Chapter 2

# QCD on the Lattice



## Chapter 3

# Pure Gauge Theories: a First Implementation



## Part II

A QCD problem I should be  
considering





## Chapter 4

# The nucleon EDMa?



## Part III

# Conclusion and Discussion



## Chapter 5

# Summary and Conclusion



## Chapter 6

# Future Developements





# Bibliography

- [1] Schroder Peskin. *An Introduction to Quantum Field Theory*. Cambridge University Press, 1989.