

LIST OF FIGURES

1.1	The particle content of the Standard Model, excluding the Higgs boson. Figure from Ref. [61].	4
1.2	The vector (left) and pseudoscalar (right) meson nonets. The labels Y and I_3 indicate the hypercharge and isospin quantum numbers, respectively. The masses of all of these particles are less than about 1 GeV, and typically vary by a few hundred MeV within each nonet. However, the pions (π^- , π^0 , π^+) are anomalously light. The reason for this emerges naturally from QCD. The figures are from Ref. [105].	5
1.3	The charmonium spectrum. Black lines denote charmonium states, and red dots indicate charmonium-like states. Blue lines indicate the thresholds at which states can decay into a pair of D mesons, which contain a charm quark and a light quark. Note that most of the J^{PC} quantum numbers assigned to the XYZ states here are speculative (Ref. [20] lists the possible J^{PC} for each XYZ state). Figure taken from Ref. [53].	8
1.4	Examples of Feynman diagrams that contribution to the perturbative expansion of the correlation function in Eq. (1.19). Straight and wavy lines represent quark and gluon propagators, respectively. Each vertex represents the local interaction between quark and gluon fields given by (1.21), and hence introduces a factor of the coupling g . Diagrams with more vertices correspond to higher order terms in the perturbative expansion. Note that the first three diagrams can also occur in QED, where the gluons are replaced with photons. However, the fourth diagram includes a direct interaction between gluon fields and has no equivalent in QED. These Feynman diagrams were produced using JaxoDraw [23].	17
1.5	Feynman diagram representing the quark self-energy. The quark propagates between the spacetime points y and x , and has momentum q at these locations. The quark interacts with a gluon that has momentum k , which flows from right to left in the diagram. Momentum is conserved at each vertex in the diagram.	23
1.6	Experimental and theoretical predictions for the running QCD coupling $\alpha(\mu)$. Figure taken from Ref. [20].	33
1.7	Integration contour used to derive the dispersion relation between the correlation function and its imaginary part. The correlation function has a branch cut on the interval $z \in (-\infty, -t_0]$, where t_0 is the hadronic threshold.	35
1.8	Contour integral used to calculate the inverse Laplace transform in Eq. (1.91). The function has a branch cut on the interval $Q^2 \in (-\infty, -t_0]$, where t_0 is the hadronic threshold.	39