Heavy Quark QCD at Finite Temperature and Density Using an Effective Theory

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Introduction

The current state of human knowledge suggests that the majority of the visible matter in the universe is made up of hadrons that are themselves build up from quarks and gluons. We have so far discovered six species, or flavours, of quarks, namely the up, down, strange, charm, top and bottom. These fundamental particles carry three sets of charges: electric charge, flavour charge and colour charge. It is the latter of these that manifest itself through the confinement process that binds the quarks together into inseparable hadrons, and the resulting binding energy is responsible for almost 99 % of the mass of these bound particles. For example the proton weights 938.27 MeV, while its constituents, two up quarks and a single down quark, have a total rest mass of no more than 9.8 (1.9) MeV [Olive et al., 2014].

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Bibliography

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