Abstract:

In this talk, I will start with an overview of the essentials of particle physics. The overview is a bootstrapped version of my readings of several articles, on the topic of sub-atomic particles, for a general audience. The Higgs Boson is a sub-atomic particle.

The overview will be followed by the presentation of a system of equations developed by several Noble Prize winning physicists, known as the ***Lattice Quantum Chromodynamic Equations***, abbreviated QCD. The Lattice QCD Equations endeavor to estimate the mass of a sub-atomic particle. They are notoriously difficult to solve because one encounters here the scenario of a finite number of equations, each equation the result of a physics based code, for estimating an infinite number of parameters. The physics based codes are time consuming and expensive to run; thus the finite number of equations.

A simplifying assumption, namely, that of constant spacing, enables me to identify a telescopic pattern to these equations; this partly eases the burden of infinite dimensions. A statistical model can then be endowed on the simplified QCD equations, and a Marko Chain Monte Carlo based method can be invoked to perform the necessary estimation. The follow up talk discusses the MCMC algorithm and the manner in which the effects of the simplifying assumption can be dealt with. Our work, done jointly with a particle physicist, is able to produce results which go beyond that which is currently available in the physics literatures. It has appeared in ***Statistical Science***.