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A PROBLEM IN PARTICLE PHYSICS AND ITS BAYESIAN ANALYSIS

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The lattice QCD problem of particle physics entails the estimation of an infinite number of parameters from a finite number of equations. By introducing a nuisance parameter into the QCD system we are able to identify a pattern which tantamount to reducing the system of equations to a telescopic series. A statistical model is then endowed on the series, and inference about the unknown parameters done via a Bayesian approach. A computationally intensive Markov Chain Monte Carlo (MCMC) algorithm is then invoked to implement the approach. The approach is then validated against simulated as well as data generated by a physics code pertaining to the quark masses of protons and pions.

This paper demonstrates a nice interplay between a problem in modern physics and its solution using modern Bayesian statistical techniques.