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Lattice QCD

Quantum Chromodynamics under extreme conditions: heating up quarks and gluons.

My research involves using Kernel methods to reconstruct spectral functions from Euclidean correlator data. Correlator data is taken at discrete time steps and thus the spectral functions cannot be analytically determined. Spectral functions are sought after, as they allow us to determine the properties of hadrons, such as mass, amplitude, and width of resonances. We will also be using them to look at transport properties such as electrical conductivity.

I completed both my BSc and MSci in Physics at the University of Nottingham. For my Masters, I investigated the phenomenon of dissipative binding and the Zeno subspace for a 1D lattice. I have since moved to Swansea univeristy to work in lattice QCD and investigate the QCD phase diagram. My research thus far involves using machine learning methods to reconstuct spectral functions. In the future I will be able to use these spectral functions to invetigate QCD at finite temperatue and/or baryon chemical potential. I am fluent in Python and regularly use modules such as scikit learn and tensorflow.

In the last year I have taken courses in High Performance Computing (HPC). The skills from these courses will be of use at a later stage of my project when I begin to work with a larger data set. I am looking into different machine learning methods in order to improve the current algorithm. It is hoped that this machine learning methods will give better results than the Maximum Entropy Method (MEM) which using Bayesian probablites.