Project 20/2014: "**Static Quark Correlators in lattice QCD at non-zero temperature**"

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Abstract:
We propose to calculate correlators of static quarks in 2+1 flavor QCD for physical strange and light quark masses at high temperatures using the Highly Improved Staggered Quark (HISQ) action.

It is known from lattice QCD that strongly interacting matter undergoes a transition to a deconfined phase also called quark gluon plasma (QGP) characterized by chiral symme- try restoration and color screening [1]. Quarkonia have been suggested as experimental signature of deconfinement in heavy ion collisions by Matsui and Satz [2]. Namely, it has been argued that color screening in a deconfined QCD medium will suppress the existence of quarkonium states, signaling the formation of QGP in heavy-ion collisions. At present the study of quarkonium production in heavy ion experiments is a large the- oretical and experimental effort (see e.g. Ref. [3] for a recent review). To understand quarkonium production in heavy ion collisions it is necessary (although not sufficient) to know quarkonium spectral functions at non-zero temperature, since in-medium prop- erties of quarkonium states and their dissolution are encoded in the spectral functions. Direct lattice QCD calculations of the spectral functions in lattice QCD are difficult. This is due to the fact that lattice QCD is formulated in Euclidean time and it turned out that Euclidean time quarkonium correlation functions are not sensitive to the in-medium quarkonium properties [4]. On the other hand significant progress has been made in studying in-medium quarkonium properties using effective field theory approach (see e.g. [5, 6, 7, 8]) in the weak coupling regime. The aim of this proposal is to calculate correlators of static quarks in lattice QCD that in combination with effective theory approach can be used to predict quarkonium properties at non-zero temperature beyond the weak coupling regime.