

T 19: Gittereichtheorie

Zeit: Montag 16:45–18:30

Raum: KGI-HS 1023

T 19.1 Mo 16:45 KGI-HS 1023

Evolutionary Fitting Methods for Mass Spectra in Lattice Field Theory — ●GEORG VON HIPPEL¹, RANDY LEWIS², and ROB PETRY² — ¹DESY Zeuthen, D-15738 Zeuthen — ²University of Regina, Regina (Saskatchewan), Kanada

The spectrum of masses from a lattice QCD simulation may be found by fitting exponential functions to correlators of operators possessing the quantum numbers of the particles of interest. The ability of evolutionary algorithms to find globally optimized solutions containing a variable number of states across multiple data sets is exploited to provide a promising solution to the problem of finding these fits.

T 19.2 Mo 17:00 KGI-HS 1023

Towards upper Higgs mass bounds from a chirally invariant lattice Higgs-Yukawa model — ●PHILIPP GERHOLD¹, KARL JANSEN², and JIM KALLARACKAL¹ — ¹Humboldt-Universität Berlin — ²DESY, Zeuthen

We consider a chirally invariant lattice Higgs-Yukawa model based on the Neuberger overlap operator. As a first step towards the eventual determination of Higgs mass bounds we present the phase structure of the model analytically in the large N_f -limit and compare these results with corresponding Monte Carlo simulations. From these findings we identify the physically relevant region of the model parameter space. Finally, we present first and preliminary results on the Higgs mass upper bound obtained from this pure Higgs-Yukawa model.

T 19.3 Mo 17:15 KGI-HS 1023

$N = 1$ supersymmetric Yang-Mills theory on the lattice — ●KAMEL DEMMOUCHE¹, FEDERICO FARCHIONI¹, ALEXANDER FERLING¹, ISTVÁN MONTVAY², and GERNOT MÜNSTER¹ — ¹Universität Münster, Institut für Theoretische Physik, Wilhelm-Klemm-Strasse 9, D-48149 Münster, Germany — ²Deutsches Elektronen-Synchrotron DESY, Notkestr.85, D-22603 Hamburg, Germany

We perform Monte Carlo investigations of the $N = 1$ supersymmetric Yang-Mills (SYM) theory on the lattice with dynamical gluinos. The motivation is the determination of the mass spectrum of the low-lying bound states of the theory. These states are expected to form two supermultiplets consisting of gluinoballs, glueballs and gluino-glueballs. We adopt the Wilson discretization of the action, which explicitly breaks SUSY and chirality at finite lattice spacing. At gauge coupling $\beta = 2.3$, we analyzed $16^3 \cdot 32$ lattices at three values of the gluino mass ($\kappa = 0.1955, 0.196, 0.1965$). The critical gluino mass, where the restoration of chiral symmetry and the supersymmetry is expected in the continuum limit, is estimated to be $\kappa_{cr} \simeq 0.1969$. The two-step multi-bosonic (TSMB) Monte Carlo algorithm is used for the dynamical gluino. Some features of a novel Polynomial-Hybrid-Monte-Carlo (PHMC) implementation are also discussed.

T 19.4 Mo 17:30 KGI-HS 1023

Polyakov loops from Dirac spectra — EREK BILGICI², ●FALK BRUCKMANN¹, CHRISTOF GATTRINGER², and CHRISTIAN HAGEN¹ — ¹Institut für Theoretische Physik, Universität Regensburg — ²Institut

für Physik, FB Theoretische Physik, Universität Graz

For QCD at finite temperature, the Polyakov loop and the chiral condensate are two order parameters characterizing the deconfinement and chiral phase transition, respectively. We present a method that aims at relating the two by representing lattice Polyakov loops through spectral sums of lattice Dirac (or Laplace) operators. By virtue of numerical results we analyze the role of the eigenvalues in the spectral sums and the possibility to define dressed Polyakov loops in this way.

T 19.5 Mo 17:45 KGI-HS 1023

Gittersimulationen bei Realzeit und das Quark-Gluon-Plasma — ●MARCUS TASSLER — Institut für theoretische Physik, Wilhelm-Klemm-Str. 9, 48149 Münster, Deutschland

Im Rahmen dieses Beitrags wird die kinetische Theorie des Quark-Gluon-Plasmas bei hohen Temperaturen sowie die Simulation der Plasmadynamik unter Verwendung von Realzeit-Gittertechniken diskutiert. Der Bezug zu aktuellen Fragestellungen wird über den Beitrag der genannten Techniken zur Untersuchung der Spektralfunktion schwerer Quarkonia bei endlicher Temperatur sowie der Rolle von Plasmastabilitäten für die schnelle Thermalisierung des Quark-Gluon-Plasmas in Schwerionenkollisionen hergestellt.

T 19.6 Mo 18:00 KGI-HS 1023

Starkkopplungsentwicklungen in der Gittereichtheorie bei endlichen Temperaturen — ●JENS LANGELEGE, GERNOT MÜNSTER und OWE PHILIPSEN — Institut für Theoretische Physik, Universität Münster, Deutschland

Euklidische Starkkopplungsentwicklungen werden auf Gitter-Yang-Mills-Theorien bei endlichen Temperaturen, d.h. für Gitter mit kompaktifizierter Zeitrichtung, angewendet. Wir haben die ersten Ordnungen dieser Entwicklungen für die freie Energiedichte der Eichgruppen SU(2) und SU(3) berechnet. Die resultierende Reihe kann aufsummiert werden und entspricht in den niedrigsten Ordnungen einem Glueball-Gas.

Durch Analyse der Reihenkoeffizienten ist es unser Ziel einen Wert für die nächstgelegene reelle Singularität β_c zu finden. Diese Singularität markiert den Deconfinement-Phasenübergang. Methoden und Schwierigkeiten dieser Analyse werden diskutiert.

T 19.7 Mo 18:15 KGI-HS 1023

The spectrum of the Dirac-Wilson operator in $N_f = 1$ QCD — ●JAIR WUILLOUD — Institut für theoretische Physik (WWU); Wilhelm-Klemm Str., 9; 48149 Münster

For QCD with $N_f = 1$ flavour, lattice numerical studies of the phase structure should allow for the investigation of questions like the definition of the quark mass and a possible symmetry breaking of CP.

Around interesting points in the phase diagram, situations arise where the determinant of the Dirac-Wilson operator becomes negative and its sign has to be computed.

We discuss techniques for evaluating the spectrum of the Dirac-Wilson operator and the sign of its determinant.