MP 9: Lattice Theory, Critical Phenomena and Vacuum Structure

Zeit: Mittwoch 14:00–15:55   Raum: SFG 2010

Hauptvortrag   MP 9.1   Mi 14:00   SFG 2010
Non-perturbative investigations of supersymmetry on a space-time lattice — •Georg Bergner — Institute of Theoretical Physics, Friedrich-Schiller-University Jena, Max-Wien-Platz 1, D-07743 Jena

In this talk I will discuss the motivations, difficulties and progress in the study of supersymmetric gauge theories with numerical methods on a space-time lattice. As an interesting example I will review in more detail the results for N=1 supersymmetric Yang-Mills theory. I will conclude with a summary of the current status and the prospects for the future of the general numerical lattice investigations of supersymmetric theories.

10 min. break

MP 9.2   Mi 14:55   SFG 2010
$\mathcal{N} = 1$ **supersymmetric SU(3) Yang-Mills theory on the lattice** — •Marc Steinhauser, Andreas Wipf, André Sternbeck, and Björn Wellegehausen — Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität Jena, 07743 Jena, Germany

We investigate the fourdimensional SU(3) Yang-Mills theory with $\mathcal{N} = 1$ supersymmetry. This theory contains meson-like gluinoballs, gluino-glueballs and pure glueballs as bound states. In my talk, I will present first results with focus on particle masses. Another part of our

investigation aims at the understanding of the chiral symmetry and its breaking mechanism. A fine tuning of the bare gluino mass is necessary to ensure the restauration of the supersymmetry and the chiral symmetry in the continuum limit. After setting the scale, we can relate the dimensionless lattice quantities to physical observables and compare them to their counter-parts in quantum chromodynamics.

MP 9.3   Mi 15:15   SFG 2010
Gross-Neveu-Yukawa models at criticality — •Benjamin Knorr — Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität Jena

We present new estimates for critical quantities of Gross-Neveu-Yukawa models, obtained with nonperturbative renormalisation group techniques. These models play a central role in many areas of physics, e.g. in the description of graphene or as an effective low energy model to QCD.

MP 9.4   Mi 15:35   SFG 2010
Non-perturbative methods in QFT and the unstable vacuum — •Ibrahim Akal — Theory Group, Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany

In this talk we will present some non-perturbative methods in quantum field theory. Various applications will be adressed, mainly in the context of unstable vacua under extreme conditions.