MP 6: Quantum Field Theory

Zeit: Mittwoch 8:30–9:45 Raum: JUR H

MP 6.1 Mi 8:30 JUR H

Supersymmetry and the Functional Renormalization Group — Jens Braun, Holger Gies, •Franziska Synatschke, and Andreas Wipf — Theoretisch-Physikalisches Institut, FSU Jena, Deutschland

Dynamical supersymmetry breaking is an important issue for applications of supersymmetry in particle physics. Many approaches to investigate this problem break supersymmetry explicitly and it is hard to distinguish between dynamical and explicit supersymmetry breaking. The functional renormalization group equations allow for a nonperturbative approach that leaves supersymmetry intact. Therefore they offer a promising tool to investigate the dynamical breaking of supersymmetry. In this talk we will employ this method to investigate the $N = 1$ Wess-Zumino model in three dimensions at finite temperature. We will recover many aspects of finite temperature QFT such as dimensional reduction and the the Stefan-Boltzmann law. Also we will discuss supersymmetry breaking through the thermal boundary conditions and the phase diagram for the breaking of the $\mathbb{Z}_2$-symmetry at finite temperatures.

MP 6.2 Mi 8:55 JUR H

Confinement in G_2 Gauge Theories — •Björn H. Wellegehausen, Christian Wozar, and Andreas Wipf — Theoretisch-Physikalisches Institut, FSU Jena

G_2 is the smallest simple and simply connected lie group with a trivial center. Therefore investigations of G_2 gauge theorie help to clarify the relevance of center symmetry for confinement. Beside this it has an intriguing connection to $SU(3)$ gauge theory. If one couples a scalar field in the fundamental representation to the gauge field one can break the G_2 gauge symmetry to $SU(3)$ gauge symmetry. The representation theory and its implications for confinement are reviewed and the full phase diagram of the gauge higgs model, obtained by monte carlo simulations, is presented.

MP 6.3 Mi 9:20 JUR H

On time-dependent resonances for the Dirac equation and their adiabatic behavior — •Nikodem Szpak — Fakultät für Physik, Universität Duisburg-Essen

Studying spontaneous particle creation in strong external (electromagnetic) fields of QED we face the problem of description of the time-dependent resonances for the Dirac equation and the lack of adiabatic theorems for such systems. We present our analytical and numerical approaches to this problem as well as concepts developed on the way to formulation of the corresponding adiabatic theorems.