MP 6: Felder und Strings

Zeit: Mittwoch 16:20–17:40   Raum: M010

MP 6.1   Mi 16:20   M010

Local retarded off-shell intertwiners of covariant phase spaces - towards a nonperturbative construction — ROMEO BRUNETTI[1], KLAUS FREDENHAGEN[2], and •PEDRO LAURIDSEN RIBEIRO[2] — [1]Dipartimento di Matematica, Facoltà di Scienze Matematiche, Fisiche e Naturali, Università degli Studi di Trento, Italien — [2]II. Institut für theoretische Physik der Universität Hamburg

We describe the current status of a nonperturbative and mathematically rigorous construction of nonlinear operators acting on (a neighbourhood of the origin of) the space of smooth sections of a vector bundle over a general spacetime, which intertwine a pair of (left-hand sides of) strictly hyperbolic, second-order Euler-Lagrange field equations which differ by a compactly supported interaction term, and act as the identity in the remote past, thus playing the role of the retarded Møller operators from scattering theory. These operators were introduced by Dütsch and the second author in the context of perturbative algebraic quantum field theory. This construction is off-shell and makes use of a Nash-Moser iteration scheme.

MP 6.2   Mi 16:40   M010

Differential cohomology and gauge theories — •ALESSANDRO VALENTINO — Mathematisches Institut, Georg-August-Universitaet Goettingen Bunsenstr. 3-5 D-37073, Goettingen, Germany

I will give an introduction to the applications of (generalized) differential cohomology to the gauge theory of p-form fields relevant to supergravity and string theory.

MP 6.3   Mi 17:00   M010

Cartesian integration of Grassmann variables over invariant functions — •MARIO KIEBURG, HEINER KOHLER, and THOMAS GUHR — Universität Duisburg-Essen, Lotharstraße 1, 47048 Duisburg

Supersymmetry plays an important role in field theory as well as in random matrix theory and mesoscopic physics. Anticommuting variables are the fundamental objects of supersymmetry. The integration over these variables is equivalent to the derivative. Recently [arxiv:0809.2674v1[math-ph] (2008)], we constructed a differential operator which only acts on the ordinary part of the superspace consisting of ordinary and anticommuting variables. This operator is equivalent to the integration over all anticommuting variables of an invariant function. We will present this operator and its applications for functions which are rotation invariant under the supergroups $U(k_1/k_2)$ and $UOSp(k_1/k_2)$.

MP 6.4   Mi 17:20   M010

'Weight' in the landscape from Quark and Lepton Masses — •KOUSHIK DUTTA — Max Planck Institute for Physics, Fohringer Ring 6, 80805, Munich, Germnay

Even if quark and lepton masses are not uniquely predicted by the fundamental theory, as may be the case in the string theory landscape, nevertheless their pattern may reveal features of the underlying theory. We use statistical techniques to show that the observed masses appear to be representative of a scale invariant distribution, rho(m) ~ 1/m. If we extend this distribution to include all the Yukawa couplings, we show that the resulting CKM matrix elements typically show a hierarchical pattern similar to observations. The Jarlskog invariant measuring the amount of CP violation is also well reproduced in magnitude. We also apply this framework to neutrinos using the seesaw mechanism. Our framework highly favors a normal hierarchy of neutrino masses and predicts several presently unmeasured observables.

In addition, using the scale invariant weight for the Yukawa couplings and imposing anthropic constraints on the existence of atoms, we estimate the likelihood function for the Higgs vev. The result favors values close to the observed vev.