MP 13: Quantum Field Theory

Zeit: Donnerstag 15:00–16:15 Raum: JUR H

MP 13.1 Do 15:00 JUR H

New Aspects of Conformal Symmetry in 3+1 Dimensions — •Karsten Busse — Nat.Fak. II, Physik/Chemie, Martin-Luther-Universität Halle-Wittenberg, 06099 Halle (Saale)

It is known since one hundred years, that the conformal group C(1,3) is the space symmetry group of electromagnetism. With the success of Dirac's spinor equation for the description of electron and other leptons, it was also tried to apply C(1,3), but masses introduce a scale to the theory, which is in contradiction to the dilation invariance of C(1,3). To obtain scale invariance, the masses must be related to other phaenomena (like symmetry breaking) or new particles (e.g. dilaton, Higgs). Another approach using conformal symmetry is the introduction of twistors in 4+2 dimensions, the covering space of the linearized conformal group.

It will be shown, that by using a conformal spinor, a conform invariant Lagrangean can be constructed without external fields, including a conventional mass term. With respect to Lorentz-Transformations, this spinor behaves like a Dirac spinor, but dilation, translation and special conformal transformations induce differences. The coupling to gauge bosons is not affected and can be included into the theory just the same way as in Dirac theory. The conformal transformation symmetry can be broken by a simple transformation, which leads to left handed Dirac particle, but with a chiral mass component.

MP 13.2 Do 15:25 JUR H

Deterministic field theory from dynamic compact space-time dimensions — •Donatello Dolce — ThEP, Mainz

We propose an unexplored quantization method in field theory. It is based on the assumption of dynamic space-time intrinsic periodicities for relativistic fields, which in turn can be regarded as dual to extra-dimensional fields. In a generalization of the AdS/CFT correspondence, we obtain a unified and consistent interpretation of Special Relativity and Quantum Mechanics in terms of Deterministic Geometrodynamics.

MP 13.3 Do 15:50 JUR H

Deducing the three gauge interactions from the three Reidemeister moves — •Christoph Schiller — München

We give one of the first known arguments for the origin of the three observed gauge groups. The argument is based on modelling nature at Planck scales as a collection of featureless strands that fluctuate in three dimensions. This approach models vacuum as untangled strands and particles as tangles of strands.

Modelling vacuum as untangled strands implies the field equations of general relativity, when applying an argument from 1995 to the thermodynamics of strands. Modelling fermions as tangles of two or more strands allows to define wave functions as time-averages of strand crossings; using an argument from 1980, this allows to deduce the Dirac equation.

When modelling fermions as tangled strands, gauge interactions appear naturally as deformation of tangle cores. The three possible types of observable core deformations are given by the three Reidemeister moves. They naturally lead to a U(1), a broken and parity-violating SU(2) and a SU(3) gauge group.

The model is unique, is unmodifiable, is consistent with all known data, and makes numerous testable predictions, including the absence of other interactions, of grand unification and of higher dimensions. A method for calculating coupling constants seems to appear naturally.

The page www.motionmountain.net/research provides additional details.