MP 9: Quanten+Gravitation 2

Zeit: Mittwoch 17:15–18:30 Raum: HS 8

MP 9.1 Mi 17:15 HS 8

Fermions in curved space — •Stefan Lippoldt and Holger Gies — Theoretisch-Physikalisches Institut, Jena, Deutschland

The Dirac equation gives rise to the Clifford algebra for the Dirac γ matrices, which holds also in curved spacetime. This algebra is invariant under diffeomorphisms as well as local spin base transformations $SL(4,\mathbb{C})$. It is shown that there exists a formalism due to A. Weldon in which the necessary covariant derivative can be constructed from the γ matrices itself without recourse to a vierbein construction. The well-known vierbein formalism is included as a special gauge choice for the γ matrices. We use this formalism to study symmetry breaking transitions of fermion systems on curved space.

MP 9.2 Mi 17:40 HS 8

Mode decomposition and Fourier analysis of physical fields in homogeneous cosmology — •Zhirayr Avetisyan — Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany — Institut für Theoretische Physik, Universität Leipzig, Germany

The methods of mode decomposition and Fourier analysis of quantum fields on curved spacetimes previously available mainly for the scalar fields on Friedman- Robertson-Walker spacetimes are extended to arbitrary vector fields on general spatially homogeneous spacetimes. This is done by developing a rigorous unified framework which incorporates mode decomposition, harmonic analysis and Fourier analysis. Explicit constructions are performed for a variety of situations arising in homogeneous cosmology. A number of results concerning classical and quantum fields known for very restricted situations are generalized to cover almost all cosmological models.

MP 9.3 Mi 18:05 HS 8

Diffeomorphism invariant quantum fields in perturbative algebraic quantum field theory — •Katarzyna Rejzner — University of Rome Tor Vergata, Italy

In this talk I will discuss the notion of diffeomorphism invariant quantities in locally covariant quantum field theory. This is important especially in the context of quantum gravity. In the paper "Batalin-Vilkovisky formalism in the functional approach to classical field theory" of K. Fredenhagen and myself from 2011 we proposed to define diffeomorphism invariant classical fields with the use of a certain generalization of the Batalin-Vilkovisky formalism. Here I will present a similar result which was obtained recently also for quantum fields.